THE IMPERIAL ENCYCLOPEDIA AND DICTIONARY

A LIBRARY OF UNIVERSAL KNOWLEDGE AND AN UNABRIDGED DICTIONARY OF THE ENGLISH LANGUAGE UNDER ONE ALPHABET

IN FORTY VOLUMES

VOLUME 36

STRIDE—THAMMUZ

NEW YORK HENRY G. ALLEN & COMPANY

SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr, stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th	though, breathe	*thō, brēth.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

ABBREVIATIONS USED IN THIS WORK.

a., *or* adj....adjective
A.B.....Bachelor of Arts
abbr.....abbreviation, abbreviated
abl. *or* abla.ablative
Abp.....Archbishop
abt.....about
Acad.....Academy
acc. *or* ac..accusative
accom.....accommodated, accommodation
act.....active
A.D.....in the year of our Lord [*Anno Domini*]
Adjt .....Adjutant
Adm .....Admiral
adv. *or* ad..adverb
A. F.....Anglo-French
Ag.....Silver [*Argentum*]
agri.....agriculture
A. L.....Anglo-Latin
Al.....Aluminium
Ala.....Alabama
Alb.....Albanian
alg.....algebra
A.M.....before noon [*ante meridiem*]
A.M .....Master of Arts
Am.....Amos
Amer.....America, -n
anat.....anatomy, anatomical
anc.....ancient, anciently
AN. M.. ....in the year of the world [*Anno Mundi*]
anon.....anonymous
antiq.....antiquity, antiquities
aor.....aorist, -ic
app.....appendix
appar.....apparently
Apr.....April
Ar.....Arabic
arch.....architecture
archæol....archæology
arith.....arithmetic
Ark.....Arkansas
art.....article
artil..... artillery
AS.....Anglo-Saxon
As.....Arsenic
Assoc.....Association
asst.....assistant
astrol.....astrology
astron... ..astronomy
attrib.....attributive
atty.....attorney
at. wt.....atomic weight
Au.....Gold [*Aurum*]
A.U.C.....in the year of the building of the city (Rome) [*Annourbis conditæ*]
Aug.....August
aug.....augmentative
Aust.....Austrian
A. V.....authorized version [of Bible, 1611]
avoir.....avoirdupois
B.....Boron
B.....Britannic
b.....born
Ba.....Barium
Bart.....Baronet
Bav.....Bavarian
bl.; bbl....barrel; barrels
B.C.....before Christ
B.C.L.....Bachelor of Civil Law
B.D.....Bachelor of Divinity
bef.....before
Belg.....Belgic
Beng.....Bengali
Bi.....Bismuth
biog.....biography, biographical
biol.....biology
B.L.....Bachelor of Laws
Bohem.....Bohemian
bot.....botany, botanical
Bp.....Bishop
Br.....Bromine
Braz.....Brazilian
Bret.....Breton
Brig.....Brigadier
Brit.....British, Britannica
bro.....brother
Bulg.....Bulgarian
bush.....bushel, bushels
C.....Carbon
c.....century
Ca.....Calcium
Cal.....California
Camb.....Cambridge
Can.....Canada
Cant.....Canterbury
cap.....capital
Capt.....Captain
Card.....Cardinal
carp.....carpentry
Cath.....Catholic
caus.....causative
cav.....cavalry
Cd.....Cadmium
Ce.....Cerium
Celt.....Celtic
cent.....central
cf.....compare [*confer*]
ch *or* chh...church

Chal.....Chaldee
chap.....chapter
chem.....chemistry, chemical
Chin.....Chinese
Chron.....Chronicles
chron.....chronology
Cl.....Chlorine
Class.....Classical [= Greek and Latin]
Co.....Cobalt
Co.....Company
co.....county
cog.....cognate [with]
Col.....Colonel
Col.....Colossians
Coll.....College
colloq.....colloquial
Colo.....Colorado
Com.....Commodore
com.....commerce, commercial
com.....common
comp.....compare
comp.....composition, compound
compar....comparative
conch.....conchology
cong.....congress
Congl.....Congregational
conj.....conjunction
Conn *or* Ct.Connecticut
contr.....contraction, contracted
Cop.....Coptic
Cor.....Corinthians
Corn.....Cornish
corr.....corresponding
Cr.....Chromium
crystal.....crystallography
Cs.....Cæsium
ct.....cent
Ct.*or* Conn.Connecticut
Cu.....Copper [*Cuprum*]
cwt.....a hundred weight
Cyc.....Cyclopedia
D.....Didymium
D. *or* Dut..Dutch
d.....died
d. [l. s. d.]..penny, pence
Dan.....Daniel
Dan.....Danish
dat.....dative
dau.....daughter
D. C.....District of Columbia
D.C.L.....Doctor of Civil [or Common] Law
D.D.....Doctor of Divinity
Dec.....December
dec.....declension
def.....definite, definition
deg.....degree, degrees
Del.....Delaware
del.....delegate, delegates
dem.....democratic
dep.....deputy
dep.....deponent
dept.....department
deriv.....derivation, derivative
Deut.....Deuteronomy
dial.....dialect, dialectal
diam.....diameter
Dic.....Dictionary
diff.....different, difference
dim.....diminutive
dist.....district
distrib.....distributive
div.....division
doz.....dozen
Dr.....Doctor
dr.....dram, drams
dram.....dramatic
Dut. *or* D...Dutch
dwt.....pennyweight
dynam *or* dyn.....dynamics
E.....Erbium
E. *or* e.....East, -ern, -ward
E. *or* Eng..English
Eccl.....Ecclesiastes
eccl. *or* eccles.... } ecclesiastical [affairs]
ed.....edited, edition, editor
e.g.....for example [*ex gratia*]
E. Ind. *or* E. I..... } East Indies, East Indian
elect.....electricity
Emp.....Emperor
Encyc.....Encyclopedia
Eng. *or* E..English
engin.....engineering
entom.....entomology
env. ext....envoy extraordinary
ep.....epistle
Eph.....Ephesians
Episc.....Episcopal
eq. *or* =....equal, equals
equiv.....equivalent
esp.....especially
Est.....Esther
estab.....established
Esthon.....Esthonian
etc.....and others like [*et cetera*]
Eth.....Ethiopic
ethnog.....ethnography
ethnol.....ethnology
et seq.....and the following [*et sequentia*]
etym.....etymology
Eur.....European
Ex.....Exodus
exclam.....exclamation
Ezek.....Ezekiel
Ezr.....Ezra
F.....Fluorine
F. *or* Fahr.Fahrenheit
f. *or* fem...feminine
F. *or* Fr....French
fa.....father
Fahr. *or* F.Fahrenheit
far.....farriery
Fe.....Iron [*Ferrum*]
Feb.....February
fem *or* f. ..feminine
fig.....figure, figuratively
Fin.....Finnish
F.—L.....French from Latin
Fla.....Florida
Flem.....Flemish
for.....foreign
fort.....fortification
Fr. *or* F....French
fr.....from

freq.....frequentative
Fris.....Frisian
ft.....foot, feet
fut.....future
G. *or* Ger...German
G.....Glucinium
Ga.....Gallium
Ga.....Georgia
Gael.....Gaelic
Gal.....Galatians
gal.....gallon
galv.....galvanism, galvanic
gard.....gardening
gen.....gender
Gen.....General
Gen .....Genesis
gen..... genitive
Geno.....Genoese
geog .....geography
geol.....geology
geom.....geometry
Ger.....German, Germany
Goth.....Gothic
Gov.....Governor
govt.....government
Gr.....Grand, Great
Gr.....Greek
gr.....grain, grains
gram .....grammar
Gr. Brit....Great Britain
Gris.....Grisons
gun .....gunnery
H.....Hegira
H.....Hydrogen
h.....hour, hours
Hab.....Habakkuk
Hag.....Haggai
H. B. M.....His [or Her] Britannic Majesty
Heb.....Hebrew, Hebrews
her.....heraldry
herpet.....herpetology
Hg.....Mercury [*Hydrargyrum*]
hhd.....hogshead, hogsheads
Hind.....Hindustani, Hindu, or Hindi
hist .....history, historical
Hon .....Honorable
hort.....horticulture
Hos.....Hosea
Hung.....Hungarian
Hydros.....Hydrostatics
I.....Iodine
I.; Is.....Island ; Islands
Icel.....Icelandic
ichth.....ichthyology
Ida.....Idaho
i.e.....that is [*id est*]
Ill.....Illinois
illus.....illustration
impera *or* impr.....imperative
impers.....impersonal
impf *or* imp.imperfect
impf. p. *or* imp .....imperfect participle
improp.....improperly
In.....Indium
in... .....inch, inches
incept.....inceptive
Ind .....India, Indian
Ind .....Indiana
ind.....indicative
indef.....indefinite
Indo-Eur...Indo-European
inf.....infantry
inf *or* infin.infinitive
instr.....instrument, -al
int... .....interest
intens.....intensive
interj. *or* int.....interjection
interrog....interrogative pronoun
intr. *or* intrans...intransitive
Io.....Iowa
Ir..... ..Iridium
Ir.....Irish
Iran.....Iranian
irr .....irregular, -ly
Is.....Isaiah
It.....Italian
Jan.....January
Jap.....Japanese
Jas.....James
Jer.....Jeremiah
Jn.....John
Josh.....Joshua
Jr.....Junior
Judg .....Judges
K.....Potassium [*Kalium*]
K.....Kings [in Bible]
K.....king
Kan.....Kansas
Kt.....Knight
Ky.....Kentucky
L.....Latin
L.....Lithium
l. [l. s. d.], *or* £..... pound, [sterling] pounds
La.....Lanthanium
La.....Louisiana
Lam.....Lamentations
Lang.....Languedoc
lang.....language
Lap.....Lapland
lat.....latitude
lb.; llb. *or* lbs..... pound ; pounds [weight]
Let.....Lettish
Lev .....Leviticus
LG.....Low German
L.H.D.....Doctor of Polite Literature
Lieut.....Lieutenant
Lim .....Limousin
Lin .....Linnæus, Linnæan
lit .....literal,-ly
lit.....literature
Lith.....Lithuanian
lithog.....lithograph, -y
LL.....Late Latin, Low Latin
LL.D.....Doctor of Laws
long.....longitude
Luth.....Lutheran
M.....Middle
M.....Monsieur
m.....mile, miles
m. *or* masc..masculine
M.A.....Master of Arts
Macc. .....Maccabees
mach... ....machinery
Mag.....Magazine

Maj.....Major
Mal.....Malachi
Mal.....Malay, Malayan
manuf.....manufacturing, manufacturers
Mar.....March
masc *or* m.masculine
Mass.....Massachusetts
math. .....mathematics, mathematical
Matt.....Matthew
M.D..... ...Doctor of Medicine
MD.....Middle Dutch
Md.....Maryland
ME.....Middle English, or Old English
Me.....Maine
mech.....mechanics, mechanical
med.....medicine, medical
mem.....member
mensur....mensuration
Messrs. *or* MM.....Gentlemen, Sirs
metal.....metallurgy
metaph....metaphysics, metaphysical
meteor.....meteorology
Meth.....Methodist
Mex.....Mexican
Mg.....Magnesium
M.Gr.....Middle Greek
MHG.....Middle High German
Mic..... ..Micah
Mich .....Michigan
mid.....middle [voice]
Milan.....Milanese
mid. L. *or* ML..... } Middle Latin, Mediæval Latin
milit. *or* mil.... ..military [affairs]
min .....minute, minutes
mineral....mineralogy
Minn .....Minnesota
Min. Plen..Minister Plenipotentiary
Miss.....Mississippi
ML. *or* mid. L... } Middle Latin, Mediæval Latin
MLG.....Middle Low German.
Mlle.....Mademoiselle
Mme.....Madam
Mn.....Manganese
Mo.....Missouri
Mo.....Molybdenum
mod.....modern
Mont .....Montana
Mr.....Master [Mister]
Mrs.....Mistress [Missis]
MS.; MSS..manuscript; manuscripts
Mt.....Mount, mountain
mus.....music
MUS.DOC....Doctor of Music
myth.....mythology, mythological
N.....Nitrogen
N. *or* n.....North, -ern, -ward
n .....noun
n *or* neut...neuter
Na .....Sodium [*Natrium*]
Nah.....Nahum
N. A., *or* N. Amer.North America, -n
nat.....natural
naut.....nautical
nav.....navigation, naval affairs
Nb.....Niobium
N. C. *or* N. Car...North Carolina
N. D.....North Dakota
Neb.....Nebraska
neg.....negative
Neh.....Nehemiah
N. Eng.....New England
neut *or* n...neuter
Nev.....Nevada
N.Gr.....New Greek, Modern Greek
N. H .....New Hampshire
NHG.....New High German [German]
Ni.... .....Nickel
N. J.....New Jersey
NL .....New Latin, Modern Latin
N. Mex.....New Mexico
N. T., *or* N. Test...New Testament
N. Y.....New York [State]
nom.....nominative
Norm. F...Norman French
North. E...Northern English
Norw... ...Norwegian, Norse
Nov.....November
Num.....Numbers
numis.....numismatics
O.....Ohio
O.....Old
O.....Oxygen
Obad.....Obadiah
obj.....objective
obs. *or* †...obsolete
obsoles.....obsolescent
O.Bulg.....Old Bulgarian or Old Slavic
Oct.....October
Odontog...odontography
OE.....Old English
OF *or* O. Fr....Old French
OHG.....Old High German
Ont.....Ontario
opt... .....optics, optical
Or.....Oregon
ord .....order
ord.... ....ordnance
org.....organic
orig.....original, -ly
ornith.....ornithology
Os.....Osmium
OS. ... .Old Saxon
O. T., *or* O. Test...Old Testament
Oxf.....Oxford
oz.....ounce, ounces
P.....Phosphorus
p.; pp.....page; pages
p., *or* part..participle
Pa. *or* Penn.Pennsylvania
paint.....painting
palæon.....palæontology
parl.....parliament
pass.....passive

pathol *or* path.....pathology
Pb.....Lead [*Plumbum*]
Pd .....Palladium
Penn *or* Pa.Pennsylvania
perf.....perfect
perh.....perhaps
Pers.....Persian, Persic
pers.....person
persp.....perspective
pert.....pertaining [to]
Pet.....Peter
Pg. *or* Port. Portuguese
phar.....pharmacy
PH.D .....Doctor of Philosophy
Phen.....Phenician
Phil.....Philippians
Philem.....Philemon
philol.....philology, philological
philos. *or* phil... } philosophy, philosophical
phonog.....phonography
photog.....photography
phren.....phrenology
phys.....physics, physical
physiol.....physiology, physiological
Pied .....Piedmontese
Pl .....Plate
pl. *or* plu...plural
Pl. D.....Platt Deutsch
plupf.....pluperfect
P.M.....afternoon[*post meridiem*]
pneum.....pneumatics
P. O.....Post-office
poet.....poetical
Pol.....Polish
pol. econ...political economy
polit.....politics, political
pop... ....population
Port. *or* Pg.Portuguese
poss.....possessive
pp.....pages
pp.....past participle, perfect participle
p. pr.....present participle
Pr. *or* Prov.Provençal
pref.....prefix
prep.....preposition
Pres.....President
pres.....present
Presb.....Presbyterian
pret.....preterit
prim.....primitive
priv.....privative
prob.....probably, probable
Prof.....Professor
pron.....pronoun
pron.....pronunciation, pronounced
prop.....properly
pros.....prosody
Prot.....Protestant
Prov.*or* Pr.Provençal
Prov.....Proverbs
prov.....province, provincial
Prov. Eng..Provincial English
Prus.....Prussia, -n
Ps.....Psalm, Psalms
psychol....psychology
pt.....past tense
pt.....pint
Pt.....Platinum
pub.....published, publisher, publication
pwt.....pennyweight
Q.....Quebec
qt.....quart
qtr..... ...quarter [weight]
qu.....query
q.v.....which see [*quod vide*]
R.....Rhodium
R .....River
Rb.....Rubidium
R. Cath....Roman Catholic
rec. sec.....recording secretary
Ref.....Reformed
refl.....reflex
reg.....regular, -ly
regt.....regiment
rel. pro. *or* rel.....relative pronoun
repr.....representing
repub.....republican
Rev.....Revelation
Rev.....The Reverend
Rev. V.....Revised Version
rhet.....rhetoric, -al
R. I.....Rhode Island
R. N.....Royal Navy
Rom .....Roman, Romans
Rom.....Romanic or Romance
Rom. Cath. Ch. *or* R. C. Ch.... } Roman Catholic Church
r.r.....railroad
Rt. Rev ...Right Reverend
Ru.....Ruthenium
Russ.....Russian
r.w.....railway
S.....Saxon
S.....Sulphur
s.....second, seconds
s. [l. s. d.]..shilling, shillings
S. *or* s.....South, -ern, -ward
S. A. *or* S. Amer..South America, -n
Sam.....Samaritan
Sam.....Samuel
Sans, *or* Skr.....Sanskrit
Sb.....Antimony [*Stibium*]
s.c.....understand, supply, namely [*scilicet*]
S. C. *or* S. Car....South Carolina
Scand.....Scandinavian
Scot.....Scotland, Scotch
scr.....scruple, scruples
Scrip.....Scripture [s], Scriptural
sculp.....sculpture
S. D.....South Dakota
Se.....Selenium
sec.... ....secretary
sec.....section
Sem.....Semitic
Sep.....September
Serv.....Servian
Shaks.....Shakespeare
Si .....Silicon

Sic.....Sicilian
sing.....singular
sis.....sister
Skr. *or* Sans.....Sanskirt
Slav.....Slavonic, Slavic
Sn.....Tin [*Stannum*]
Soc.....Society
Song Sol...Song of Solomon
Sp.....Spanish
sp. gr.....specific gravity
sq.....square
Sr.....Senior
Sr.....Strontium
....Saint
....street
stat.....statute
S.T.D.....Doctor of Sacred Theology
subj.....subjunctive
suf.....suffix
Su. Goth...Suo-Gothic
superl.....superlative
Supp.....Supplement
Supt .....Superintendent
surg.....surgery, surgical
Surv.....surveying
Sw.....Swedish
Swab.....Swabian
sym.....symbol
syn.....synonym, -y
Syr.....Syriac, Syrian
t .....town
Ta.....Tantalum
Tart.....Tartar
Te.....Tellurium
technol ....technology
teleg.....telegraphy
Tenn.....Tennessee
term.....termination
terr.....territory
Teut.....Teutonic
Tex.....Texas
Th.....Thorium
theat.....theatrical
theol.....theology, theological
therap.....therapeutics
Thess.....Thessalonians
Ti.....Titanium
Tim.....Timothy
Tit.....Titus
Tl.....Thallium
toxicol.....toxicology
tp.....township
tr. *or* trans.transitive
transl.....translation, translated
trigon.....trigonometry
Turk.....Turkish
typog.....typography, typographical
U.....Uranium
ult.....ultimate, -ly
Unit.....Unitarian
Univ.....Universalist
Univ.....University
U. Presb...United Presbyterian
U. S.....United States
U. S. A.....United States Army
U. S. N.....United States Navy
Ut.....Utah
V.....Vanadium
v.....verb
Va.....Virginia
var.....variant [word]
var.....variety of [species]
Ven.....Venerable
Venet.....Venetian
vet.....veterinary
v. i. *or* v. intr....verb intransitive
vil.....village
viz.....namely, to-wit [*videlicet*]
v. n.....verb neuter
voc.....vocative
vol.....volume
vols.....volunteers
Vt.....Vermont
v. tr.....verb transitive
W.....Tungsten [*Wolfram*]
W.....Welsh
W. *or* w....West, -ern, -ward
Wal.....Walachian
Wall.....Walloon
Wash.....Washington
Westph....Westphalia, -n
W. Ind. *or* W. I...West Indies, West Indian
Wis.....Wisconsin
wt.....weight
W. Va.....West Virginia
Wyo.....Wyoming
Y.....Yttrium
yd.....yard
yr.....year
Zech.....Zechariah
Zeph.....Zephaniah
Zn.....Zinc
zool.....zoology, zoological
Zr.....Zirconium

See also ABBREVIATIONS in Vol. I.

IMPERIAL ENCYCLOPEDIA AND DICTIONARY.

STRIDE, n. *strīd* [Icel. and Sw. *strida;* Dan. *stride*, to contend, to struggle with: Low Ger. *striden*, to contend, to stride: AS. *strǣdē*, a stride]: a long step. V. to walk with long steps; to stand with the legs far apart; to pass over at a step. STRI'DING, imp. STRODE, pt. *strōd*, or STRID, pt. *strĭd*. STRIDDEN, pp. *strĭd'n*.

STRIDENT, a. *strī'dĕnt* [L. *strīdens* or *strīden'tem*, making a harsh creaking sound; *stridēre*, to creak]: characterized by harsh grating sounds, as speech; grating. STRI'DOR, n. *-dŏr* [L.]: a harsh grating sound.

STRIDULOUS, a. *strĭd'ū-lŭs* [L. *stridŭlus*, creaking—from *stridēre*, to creak: It. *stridulo*]: making a small harsh noise; squeaky; hissing; creaking. STRIDULATE, v. *strĭd'-ū-lāt*, to make a small, harsh, or creaking noise. STRID'-ULATING, imp. STRID'ULATED, pp. STRID'ULA'TION, n. *-ū-lā'shŭn*, the act of making a small, harsh, creaking noise; the noise itself.

STRIFE, n. *strīf* [OF. *estrif*, contention. Icel. *strid*, contention: Ger. *streben*, to strive, to make efforts: Low Ger. *streven*, to exert force]: contention for superiority; discord; contention in anger or enmity; conflict; quarrel; war. STRIFE'FUL, a. *-fŭl*, contentious; discordant.—SYN. of 'strife'; contention; contest; struggle.

STRIGÆ, n. plu. *strī'jē* [plu. of L. *striga*, a row or ridge in plowing]: in *arch.*, the flutings of a column; in *bot.*, little, upright, unequal, stiff hairs swelled at their bases. STRIGOSE, a. *-gōs*, covered with strigæ or sharp rigid hairs.

STRIGAU, or STRIEGAU, *strē'gow:* town of Prussia, province of Silesia, govt. of Breslau; situated on Strigau Water, 32 m. w.s.w. of Breslau. It has manufactures of woolens and linens. Pop. (1880) 11,470; (1890) 12,380.

STRIGIDÆ, *strĭj'ĭ-dē:* family of nocturnal birds of prey: see OWL.

STRIGIL, n. *strĭj'ĭl* [L. *strigilis*, a strigil—from *stringo*, I draw tight, I tie tight]: in *class. antiq.*, an instrument of metal, ivory, or horn, used by the ancients for scraping the skin at the bath; a flesh-brush.

STRIKE, v. *strīk* [Dut. *strijken*, to rub, to strike: Dan. *stryge;* Sw. *stryka*, to wipe, strike: Ger. *streich;* Dut. *streke;* Icel. *strik*, a stroke, a blow]: to give a blow to; to hit with some force; to make an attack; to act on in any way, as by a blow; to penetrate, as a tree's roots; to throw by a quick motion; to dash or be dashed; to touch ground; to run upon, as a ship; to act on by beating against; to notify by sound; to sound, as a bell; to produce by blow or friction, as fire; to cause to sound by blows; to coin or mint; to lower or take down, as a sail or flag; to ratify, as a bargain; to alarm; to surprise; to impress, as by a speech; to affect suddenly in any particular manner; in *Amer.*, to light upon, as to *strike* oil; to refrain from work in a body, as workmen for redress of some grievance, or for increase of wages (see TRADE-UNION: LABOR: BOYCOTT); to level, as a measure; in *OE.*, to punish; to afflict: N. in *OE.*, a measure; a flat piece of wood for levelling grain heaped in the measure; a cessation from work for higher wages, or on account of some grievance, by workmen; in *geol.*, direction or line of outcrop of any stratum—the line which it makes when it appears on the surface of the earth, this line being always at right angles to the dip of the bed. The angle of dip and the direction of strike are determined by a clinometer and compass. A perfectly horizontal stratum can have neither dip nor strike. STRI'KING, imp.: ADJ. affecting; surprising; impressive; exact. STRUCK, pt. pp. *strŭk*, hit with some force. STRICKEN, old pp. *strik'n*, afflicted; far gone. STRIKER, n. *strī'kĕr*, one who strikes; a seaman's name for a harpoon; in *Scrip.*, a quarrelsome man. STRI'KINGLY, ad. *-lĭ*. TO STRIKE A BALANCE, to adjust an account to show whether the Dr. or Cr. side is the larger. TO STRIKE A JURY, to constitute a jury by each party striking out a certain number of names from a prepared list. TO STRIKE A LEDGER OR AN ACCOUNT, to balance it. TO STRIKE FOR, to start suddenly on a course for. TO STRIKE HANDS WITH, to make a compact or agreement by gripping or shaking hands. TO STRIKE IN, to join or enter suddenly. TO STRIKE IN WITH, to conform; to suit itself to. TO STRIKE OFF, to separate by a blow; to erase; to deduct; to print. TO STRIKE OUT, to blot out, to efface; to devise; to form by a sudden effort, as a design; to wander. TO STRIKE SAIL, to take in sail; to cease to advance; to make no further progress. TO STRIKE UP, to begin to sing or play. TO STRIKE THE FLAG, to lower the flag. TO STRIKE WORK, to cease from working (see STRIKE UNION: ETC.). TO STRIKE UNDER, to submit. STRICKEN IN YEARS, being of an advanced age.—SYN. of 'strike, v.': to dash; stamp; impress; contract; lower; produce; effect; forge; mint.

STRIKE, LABOR: A concerted movement on the part of workingmen to compel their employers to grant some demand, such as higher wages, shorter hours, or the dismissal of a wage-earner who does not belong to the union. Occasionally it is for the purpose of supporting a S. in some other establishment, which may belong to a different department of labor, in which case it is

called a sympathetic S. The earliest known S. on record in the United States was by journeymen bakers in 1741. The first railroad strike, which was in 1877, and against a reduction in wages, failed, after $5,000,000 worth of property had been destroyed. In 1892 six strikes occurred, including that at Homestead, Pa., which required 8,000 troops to quell it. In 1894 a strike for higher wages of the 3,000 employees of the Pullman Car Co., at Chicago, was sympathetically supported by the American Railway Union of over 100,000 men. Rioting occurred with such destruction of property that President Cleveland was obliged to call out Federal troops to restore order. The loss to the railroads was $5,700,000; to the strikers in wages, $2,000,000. The S. was a failure. In the same year more than 150,000 mine workers in the United States struck against a reduction in wages, but lost $13,500,000 in wages and were only partly successful. In 1902, May 15-Oct. 23, a strike of the anthracite coal miners in Pennsylvania occurred. The demands were for a 20 per cent. increase in wages; an 8-hour workday for men paid by the day; the reduction of the size of a ton of mined coal, and the recognition of the miners' organization by the employers in considering mutual relations. Lawlessness in some districts led to the calling out of militia, and on Oct. 4 of all the militia. Meanwhile, the shortage in the coal supply, and high prices, caused actual suffering. Pres. Roosevelt brought about a cessation of the strike, operators and miners having agreed to submit the questions at issue to a commission appointed by him and to abide by its decision. The award of this commission made public 1903, March 21, secured for the miners a sliding wage scale, shorter hours, local boards of arbitration for settlement of disputes in individual collieries, and some other concessions. The operators were justified in refusing certain demands, and the right of non-union men to work without discrimination was established. The cost of this strike was estimated at over $142,000,000, including loss to strikers in wages of $29,700,000, to operators in price of coal of $55,100,000. In 1902, also, 70,000 coal miners in France struck, but were only partly successful. In 1881-1900 there were 22,793 strikes in the U. S., involving 117,500 establishments and more than 6,100,000 men, with loss in wages of $257,800,000. Of these strikes 50.77 per cent. were wholly successful. In Gt. Britain there were 3,164 strikes in 1889, and 1,028 in 1900. In United Kingdom 1897-1901 there were 3,584 strikes and lockouts, involving 1,032,475 employes.

STRING, n. *strĭng* [AS. *strenge;* Icel. *strengr;* Ger. *strang*, a cord, a string—from STRONG, which see]: a line or cord; a tape or ribbon used in fastening; twine; the cord of a musical instr.; a small fibre; a nerve; a tendon; a set or line of things; the thread on which they are strung; a series: V. to furnish with strings; to put upon a string; to make tense. STRING'ING, imp.: N. strings collectively.

STRUNG, pt. or pp. *strŭng.* STRINGED, a. *strĭngd,* furnished with strings; produced by strings. STRINGY, a. *strĭng'ĭ,* consisting of small threads; fibrous; ropy; viscid. STRING'INESS, n. *-nĕs,* state of being stringy. STRING'LESS, a. *-lĕs,* having no strings. STRING'ER, n. *-ĕr,* one who strings. STRING-BOARD, a board which faces the well-hole of a staircase and receives the ends of the steps. STRING-COURSE, thin projecting course of stone or brick-work in a wall; generally ornamented with a molding, and made to go round windows, etc. STRINGHALT, or SPRINGHALT, among *horses,* etc., lameness arising from some defects in the muscles of the hock; a sudden twitching or peculiar catching up of the horse's limbs, usually of one or both hind limbs: it is most noticeable when the animal is first brought out of the stable, when he is excited, or made to turn suddenly round. It is a variety of chorea or St. Vitus's dance. Although a serious eyesore, it does not interfere with usefulness, and is quite incurable. TO HAVE TWO STRINGS TO THE BOW, to have two methods, expedients, or professions; to have a double advantage or a twofold security. HARPING ON ONE STRING, talking on one subject, or repeating the same thing.

STRINGENDO, *strĭn-jĕn'dō:* term in music denoting gradual acceleration in time.

STRINGENT, a. *strĭn'jĕnt* [L. *stringens* or *stringen'tem,* drawing tight—from *stringĕrĕ,* to draw tight]: binding strongly; severe; rigid. STRIN'GENTLY, ad. *-lĭ.* STRIN'GENCY, n. *-jĕn-sĭ,* the act of binding strongly; strictness; severe pressure.

STRINGHAM, *strĭng'am,* SILAS HORTON: naval officer: 1798, Nov. 7—1876, Feb. 7; b. Middletown, N. Y. When 11 years of age he became a midshipman in the navy; served on the *President* in the war of 1812, and on the *Spark* in the Algerine war; was on the African coast 1819–21, and captured several slave ships, and during the next three years was active and efficient in suppressing pirates in the vicinity of the W. Indies. After being in command of the navy-yard at New York, serving in the Mexican war, and successively in charge of the navy-yards at Norfolk and Boston, he became flag-officer of the Mediterranean squadron 1853. At the opening of the civil war he commanded the blockading fleet in the n. Atlantic, but soon retired, on account of age, with the rank of commodore. He was in charge of the navy-yard at Boston 1862–65, and was afterward port-admiral at New York. He became rear-admiral on the retired list 1862, July 16. He died at Brooklyn.

STRIP, v. *strĭp* [Low Ger. *stripe;* Dut. *streep;* Ger. *streif,* a strip or long narrow portion]: to pull or tear off; to make bare or naked by depriving of a covering; to undress; to expose; to make destitute; to plunder; to divest; to bereave; to reduce to strips; in *OE.,* to cast off: N. a narrow slip, such as is stripped off at a blow; a shred STRIP'PING, imp. STRIPPED, pp. *strĭpt.* STRIP'PER, n. *-pĕr,* one who strips.

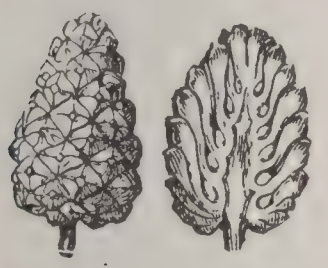
STRIPE, n. *strīp* [from STRIP, which see]: a long narrow slip of anything attached to something of a different color; a long narrow line or mark of a different shade or color; a discoloration or wale made with a lash or whip; the stroke which causes it: PLU. in *Scrip.*, punishment; affliction: V. to form or variegate with stripes; to form with lines of different colors; to beat. STRI'PING, imp. STRIPED, pp. *strīpt.*

STRIPLING, n. *strĭp'lĭng* [from STRIP, which see: comp. Norw. *strik*, a streak, a tall thin youth]: one strip-shaped; a tall slim youth; a young person; a lad.

STRIVE, v. *strīv* [from STRIFE, which see: OF. *estrif*, contention: Icel. *strīda*, to contend: Low Ger. *streven*, to exert force]: to endeavor earnestly; to labor hard; to struggle in opposition to another; to contend in emulation. STRI'VING, imp.: N. a contest. STROVE, pt. *strōv.* STRIVEN, pp. *strĭv'n.* STRIVER, n. *strī'vĕr*, one who strives.—SYN. of 'strive': to contend; vie; struggle; endeavor; emulate; aim; contest.

STROBI'LA: see TAPEWORM.

STROBILE, n. *strŏb'ĭl*, or STROBILUS, n. *strō-bī'lŭs* [Gr. *strobīlŏs*, anything twisted up, a pine-cone—from *strobos*, a turning round—from *strephō*, I turn]: in *bot.*, a multiple fruit in the form of a cone, as that of the hop or pine. STROBILIFORM, a. *strō-bī'lĭ-fawrm* [L. *forma*, shape]: shaped like a strobile. STROBILITES, n. plu. *strō-bī'līts* [Gr. *lithos*, a stone]: in *geol.*, cones occurring in the coal and other formations.



Strobile. Section of Strobile.

STROCAL, n. *strō'kăl*, or STROCKLE, n. *strō'kl:* among *glassmakers*, a tool like a shovel for emptying the chests of metal into the pots.

STRODE, v. *strōd:* see STRIDE.

STROKE, n. *strōk* [from STRIKE, which see: Gael. *strac*, a loud or crashing noise: Ger. *streich;* Dut. *streke*, a blow]: a blow; any sudden or fatal attack, as of disease—particularly, an attack of paralysis; the sound of the clock; a touch; a dash; a masterly effort; the touch of a pencil; the sweep of an oar; the upward and downward motion of the piston of a steam-engine. STROKE, n. a contr. for STROKE-OAR or STROKESMAN, in *rowing*, the man whose stroke leads the rest. STROKE OF GRACE, the finishing-stroke that ends the life of a criminal executed by breaking on the wheel; in the judicial combats of mediæval times, the stab given to put an end to the life of the vanquished.

STROKE, v. *strōk* [Ger. *streichen*, to graze or touch lightly: Low Ger. *straken*, to stroke]: to rub gently in one direction; to graze or touch lightly; to soothe; to smooth. STRO'KING, imp.: N. the act of rubbing gently with the hand. STROKED, pp. *strōkt.* STRO'KER, n. *-kĕr*, one who rubs gently. STRO'KINGS, n. plu. the last milk that can be drawn from the udder of a cow.

STROLL, v. *strōl* [Swiss, *strolen*, to rove about: prov. Dan. *strelle*, to stroll: Ger. *straucheln;* Dut. *struikelen*, to stumble]: to walk idly and leisurely; to ramble or wander on foot: N. a walk taken leisurely; a ramble. STROL'LING, imp.: ADJ. vagrant; itinerant, as a *strolling* player. STROLLED, pp. *strōld*. STROL'LER, n. *-lĕr*, one who strolls; a vagabond; an itinerant player.—SYN. of 'stroll, v.': to rove; roam; stray; wander; range.

STROMA, n. *strō'mă* [Gr. *strōma*, anything spread out for resting, a bed—from *strōnnumi*, I spread out]: in *anat.*, anything spread or laid out for resting upon; the tissue which affords mechanical support; in *bot.*, a cellular swelling at the point where a leaflet joins the midrib. STRO'-MATOL'OGY, n. *-tŏl'ŏ-jĭ* [Gr. *logos*, discourse]: the history of the formation of the stratified rocks.

STROMATEUS, *strō-măt'ē-ŭs:* genus of fish, giving name to the family *Stromateidæ*, which is not large, and is widely distributed in the warm seas.—The Butter-fish (*S. triacanthus*), very different from the Butter-fish of England (see GUNNEL), is known as Dollar-fish in Me.; Sheepshead (not the true fish of that name) at Cape Cod, Pumpkin seed in Conn., Star-fish in Va. It attains 7–8 in., about 2½ times its vertical measure, and is esteemed as food in most places. Freshly caught, the iridescent colors are brilliant; in alcohol, silvery. The young have the curious habit of sheltering themselves under jelly-fish. The Harvest-fish (*S. alepidotus*), N. Y. to Brazil, is called confusingly the Whiting at Norfolk, Va., where it is eaten; it attains 6 in. in length, and 4 in. height. The California Pompano (*S. simillimus*) of Or. also reaches a length of 8 in.; the flesh is fat, rich and excellent.—The Black Rudder-fish (*Lirus perciformis*), a stromateid, N. J. to Nova Scotia, 10–12 in., is called Log-fish and Barrel-fish, from its habit of gathering under floating logs, and barrels, etc., and is excellent food.

Fountain-shell (*Strombus gigas*).

STROMBIDÆ, *strŏm'bĭ-dē:* family of gasteropodous mollusks, of order *Pectinibranchiata*, nearly allied to *Buccinidæ* (Whelks, etc.) and *Muricidæ*. The shell has a canal, the external lip of which, as it attains maturity, be-

comes more or less dilated, and is marked with a sinus, whence the head issues when the animal comes out. The foot is narrow and small, but is employed in active leaping movements, during which the shell oscillates from side to side. The species are numerous, mostly inhabitants of tropical seas. Some are among the largest of mollusks. *Strombus gigas* is found in the W. Indies, on reefs in shallow water, and is fished both for the table and on account of the shell. Great numbers of the shells are exported; 300,000 having been sent to Liverpool in a year. They are sometimes called Fountain-shell, from occasional use as a garden ornament. Their chief use is by cameo-makers, by whom they are valued for their solid and delicately tinted substance. A shell sometimes weighs four or five lbs. Pearls of delicate pink color are sometimes found in this shell. The *Strombi* are sometimes called wing-shells, from the dilated margin of the lip.

STROMBOLI, *strŏm'bō-lē:* one of the group of the Lipari Islands (q.v.), the most n.-easterly of the group. It is about 12 m. in circumference, circular in shape, wholly of volcanic formation, and rises 3,100 ft. above sea-level. On its w. side is a volcano of considerable activity. Sulphur and pumice-stone are gathered in large quantities; and among the chief agricultural products are cotton, wine, and excellent fruits.—Pop. of island about 2,000.

STROMBULIFORM, a. *strŏm-bū'lĭ-fawrm* [L. *strombus*, a spiral shell; *forma*, shape]: in *geol.*, formed like a top; in *bot.*, twisted with a long spire.

STROMNESS': see ORKNEY ISLANDS.

STROMNITE, n. *strŏm'nīt* [from *Stromness*, in Orkney]: carbonate of strontian, a mineral occurring in yellowish-white or semi-transparent masses.

STRONG, a. *strŏng* [AS. *strang;* Icel. *strangr;* Dan. *streng;* Sw. *sträng;* Dut. *streng*, rough, rigid, strong]: having great strength or ability of body; having moral, intellectual, or material force; vigorous; healthy; muscular; robust; having the power of exerting great force; forcible; having passive power; adapted to make a deep impression on the mind or on the senses; affecting strongly; having a particular quality in a great degree; intoxicating; ardent; zealous; compact; solid; not easily overthrown or altered; fortified; denoting military strength or number, as a thousand *strong*. STRONG'LY, ad. *-lĭ*, powerfully; forcibly; in such a manner as not easily to be forced; in such a manner as to last. STRONG-BOX, a chest or safe for valuables. STRONG-MINDED, a. having a vigorous or determined mind. STRONG-SET, a. compacted or firmly set. STRONGHAND, force; violence; power. STRONGHOLD, a fortress; any place of refuge or strength.—SYN. of 'strong': vigorous; powerful; mighty; violent; impetuous; hale; positive; full; potent; rancid; valid; confirmed; violent; vehement; cogent; conclusive; able; skilful; firm; stout; muscular; energetic.

STRONG, George Crockett: soldier: 1832, Oct. 16—1863, July 30; b. Stockbridge, Vt. He graduated from West Point 1857; was at the Watervliet arsenal as assistant 1859–61, and for a short time as commander; was staff-officer to Gen. McDowell and to Gen. McClellan, and chief of staff to Gen. Butler, was in the battle of Bull Run, aided in organizing the New Orleans expedition, and rendered valuable service in Miss. and La., and in operations against Charleston 1863. While leading an assault on Fort Wagner, he received a wound, from the effects of which he died 12 days later, in New York. He was promoted brig.gen. vols. 1862, and capt. of ordnance 1863, Mar. 3. He published *Cadet Life at West Point* (1862).

STRONG, George Templeton: lawyer: 1820, Feb. 26—1875, July 21; b. New York. Graduating at Columbia Coll. 1838, he became an eminent lawyer in New York. He was treasurer of the U. S. sanitary commission during the civil war. His library was one of the best in New York.

STRONG, James, s.t.d., ll.d.: Methodist Episc. lay scholar: 1822, Aug. 14–1894, Aug. 7 b. New York. He graduated at Wesleyan Univ. 1844; was teacher of Greek and Latin in the acad. at West Poultney, Vt., 1844–46; prof. of biblical lit. and acting pres. of Troy Univ. 1858–61; and prof. of exegetical theol. in Drew Theol. Seminary, N. J., since 1868. At intervals, from ill health, he has pursued farm life; also has lived in Flushing, L. I., and been pres. of its railroad, which he originated. He was a member of the O. Test. revision committee. Besides Greek and Hebrew manuals and a Chaldee grammar, he has published *Harmony and Exposition of the Gospels* (1852); a Harmony of the same in Greek (1854); *Scripture Hist.*, derived from all sources (1878); *Irenics*, showing agreement of science and the Bible (1883); the valuable *Cyc. of Biblical, Theological, and Ecclesiastical Literature*, 10 vols. (1867–81)—the first 3 vols. in co-operation with Prof. McClintock; *The Tabernacle of Israel in the Desert* (1888); his last work (1894) was an exhaustive and complete manifold Concordance of the Bible, with many new and very valuable features, such as giving the various Greek words (in English characters) in connection with the words of the English version, with a Greek concordance (all Greek words in the Bible in English characters): this Concordance, is recognized as an aid of unparalleled value in biblical study. He edited *Daniel* and *Esther* in Lange's commentary as translated; and was one of the pioneers in the present system of Sunday-school lessons.

STRONG, James Hooker: naval officer: 1814, Apr. 26—1882, Nov. 23; b. Canandaigua, N. Y. Appointed midshipman 1829, he did not enter the naval service till the completion of his studies at the Chittenango Polytechnic Coll. 1833. He served on the Brazil station in the sloop *Lexington* 1833–35, and distinguished himself in a fight with pirates on one of the Falkland Islands. Promoted passed midshipman 1836, lieut. 1841, and commander

1861, he did duty in the blockage of the s. Atlantic coast 1861-2, and of the w. Gulf coast 1863-65: in the battle of Mobile Bay, he was the first to ram the Confederate iron-clad *Tennessee*. He was advanced to the captaincy 1865; became commodore 1870, rear-admiral 1873; commanded the s. Atlantic squadron 1873-75; and was placed on the retired list 1876, Apr. 25.

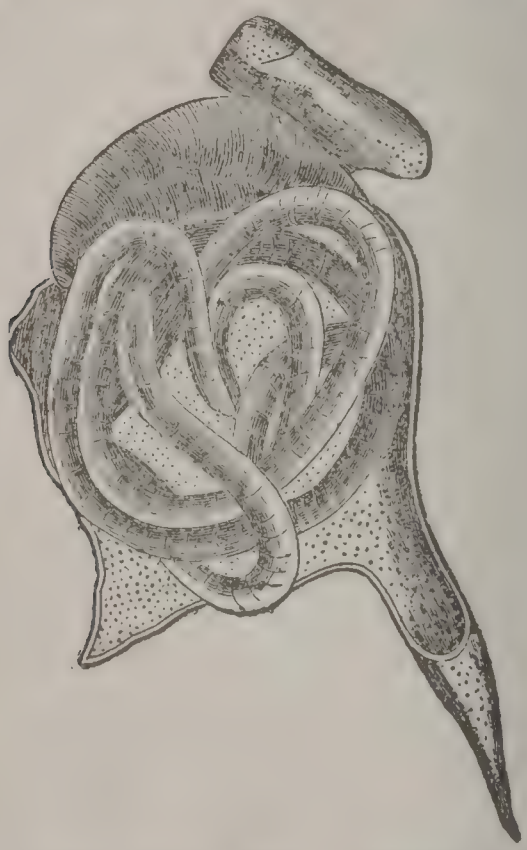
STRONG, NATHAN, D.D.: Congregational minister: 1748-1816, Dec. 25; b. Coventry, Conn.; son of the Rev. Nathan S. He graduated at Yale 1769, where he was tutor two years; studied law, and subsequently theol., and was pastor of the First Church in Hartford, Conn., 1774 until his death, for a time acting as army chaplain in the revolution. He was eminent for learning and pulpit ability. He published *The Doctrine of Eternal Misery Consistent with the Infinite Benevolence of God* (1796), and two vols. of sermons on religious revivals (1798-1800).

STRONG, THEODORE, LL.D.: 1791, July 26—1869, Feb. 1; b. South Hadley, Mass.: mathematician. After graduation at Yale 1812, he was tutor and prof. of math. and nat. philos. in Hamilton Coll. until 1827, and of the same in Rutgers Coll. until 1861, having been vice-pres. of the coll. 24 years, and becoming prof. emeritus. He was unexcelled among his contemporaries in abstract math., having solved problems attempted in vain by others, and led the way in extracting any root of an integral number by direct method. One of the corporate members of the National Acad. of Sciences, he read many papers before that body; e.g., on the *Parallelogram of Forces and on Virtual Velocities* (1864); *Integration of Differential Equations of the First Order and Higher Degrees* (1864); *New Theory of the Differential Calculus* (1865); *New Theory of Planetary Motion* (1866), etc. He published a treatise on *Elementary and Higher Algebra* (1859), and on *Differential and Integral Calculus* (1869).

STRONG, WILLIAM, LL.D.: 1808, May 6-1895, Aug. 19: b. Sommers, Conn.: graduated from Yale 1828, studied law, and began practice at Reading, Penn., 1832. He was a member of congress 1847-51, and declined another nomination; was justice of the Penn. supreme court 1857-68; resigned in the latter year and began law practice in Philadelphia; was appointed by Pres. Grant a justice of the U. S. supreme court 1870, and resigned 1880. For several years he lectured on law at the Columbian University; he was one of the members of the electoral commission 1877. He was prominently identified with the interests of the Presb. Church.

STRONG, WILLIAM L.: merchant: 1827-1900, Nov. 2; b. Richland co., O. Early in life he engaged in the dry-goods business; removed to New York 1853, where he became prominent in that business and acquired wealth. He has been pres. of the Business Men's Republican Club, of the Central National Bank, of the Homer Lee Bank-Note Co., and of other organizations. In 1894 he was elected mayor of New York on the anti-Tammany reform ticket resulting from the Lexow investigation.

STRONGYLE, n. *strŏn'jĭl*, or STRONGYLUS, n. *strŏn'jĭl-ŭs*, STRONGYLI, n. plu. *strŏn'jĭl-ī* [Gr. *strŏnggŭlos*, round, globular]: genus of family *Strongylidæ* (q.v.) of nematode parasitic worms. Infesting man, is the *S. bronchialis* of Cobbold, previously known as *Filaria hominis bronchialis*, *Hamularia compressa*, etc. The male usually is rather more than half an inch long, while the female is more than an inch. For the general and specific characters of this rare entozoon, see Cobbold's *Entozoa*, 357. The worm was discovered by Treutter 1790, who found several individuals in the bronchial glands of an emaciated subject. In 1845 it was again found by Dr. Fortsitz at Klausenberg in Transylvania, in the lungs of a boy six



Strongylus gigas.—From Cobbold's *Entozoa*

years old. These are the only two cases recorded by Küchenmeister and Cobbold of its occurring in the human subject; but closely allied species, *S. paradoxus* and *S. micrurus*, are occasionally found, according to Cobbold, in the lungs and air-passages of the pig and the calf respectively, and Küchenmeister states that he has found a species in the lungs of the sheep. A species of S. has been found in the human intestine. A worm of the same family, the *Syngamus trachealis*, causes the gapes in fowls.

Closely allied to S. is the genus *Eustrongylus* of Diesing and Cobbold, which contains the species *E. gigas*, more commonly known as the *Strongylus gigas* of Rudolphe, Cuvier, and others. This is the largest nematode worm at present known to infest man or any other animal; the male measuring 10 to 12 inches in length, and one-fourth of an inch in breadth; while the female is said to attain a length of over three ft., its transverse diameter being fully

half an inch; body cylindrical, and more or less tinged with redness; head obtuse, and furnished with a simple oval aperture surrounded by six chitinous nodules; mode of reproduction, probably viviparous; eggs broadly oval, measuring about $\frac{1}{300}''$ from pole to pole. (See Cobbold's *Entozoa*, 358). This worm occurs, according to Bremser, in the kidneys and bladder, sometimes in the abdominal cavity and the omentum, more rarely in the lungs and liver of 'martens, dogs, wolves, seals, otters, oxen, and horses.' Fortunately, it is very rare in man, and, according to Cobbold, weasels are the animals in which it is most commonly found. The accompanying figure shows one of these worms coiled up within the pelvic cavity of the kidney of one of the S. American coati, belonging to the *Procyonidæ*. The symptoms to which it must give rise must be much the same as those arising from abscess and degeneration of one of the kidneys, or from renal calculi. The diagnosis in a suspected case could be established only by detection of the eggs or embryos in the urine.—The term S. is applied also to sponge spicules of certain patterns.

STRONGYLIDÆ, *strŏn-jĭl'ĭ-dē:* family of nematode worms, possessing the following common characters: The body is round, sometimes very much elongated, and almost thread-like. The mouth is round, oval, or triangular, and at the extreme anterior end of the body. The tail of the male is commonly furnished with a bursa, usually emitting two spicules. The whole family is parasitic, and contains a number of genera. Some of the S. are parasitic in man, some in mammals, birds, reptiles, etc.

STRONSAY, *strŏn'sā:* one of the Orkney Islands, 15 m. n.e. from the town of Kirkwall. It is 7½ m. long, and 6 m. in extreme breadth. Pop. (1881) 1,274; (1891) 1,275.

STRONTIA, n. *strŏn'shĭ-ä*, or STRON'TIAN, n. *-ăn* [from *Strontian*, in Argyleshire, Scotland]: one of the alkaline earths, a grayish-white powder having an acid, burning taste (for its metallic base, see STRONTIUM): the *nitrate of strontia* is used in the form of powder in fireworks to give red color to flame. STRON'TIAN, a., or STRONTIT'IC, a. *-ĭt'ĭk*, of or pertaining to strontia. STRONTIANITE, n. *strŏn'shĭ-ăn-īt*, carbonate of strontia, a mineral of an apple-green or yellowish-brown color, occurring in variously modified hexahedral prisms and in fibrous granular masses.

STRONTIUM, *strŏn'shĭ-ŭm* (symb. Sr, at. wt. 87·6, sp. gr. 2·5): ductile and malleable metal, somewhat harder than lead, and of pale yellow color. It melts at red heat, and is more electronegative than calcium or the alkali-metals. When heated in the air, it burns with crimson flame, and becomes converted into its oxide, strontia. It is unaffected by the action of dry air, but it decomposes water at an ordinary temperature, hydrogen being explosively developed; and it burns in chlorine gas, and in the vapor of iodine, bromine, and sulphur. It dissolves in dilute nitric acid, but the strong acid has scarcely any

effect on it. S. does not occur in the native state, but exists as a carbonate in the mineral *Strontianite;* as a sulphate in the mineral known as *Celestin;* and in small quantity, as chloride or sulphate, in many brine-springs and mineral waters, in sea-water, and in the ash of bladder-wrack. It is obtained by electrolysis of chloride of strontium. S. bears to barium the same close relation that sodium bears to potassium; and the compounds of S. resemble those of barium in composition and properties.

S. monoxide, commonly known as STRONTIA, is obtained in the same way, and resembles in almost all respects the corresponding oxide of barium, except that it is inert when taken into the system, while baryta is poisonous. When a small quantity of water is poured on it, it slakes, giving out heat: the result is S. hydroxide, $Sr(OH)_2$, which dissolves readily in hot water, and separates on cooling as a hydrate, $Sr(OH)_2.8H_2O$, soluble in 50 parts of cold and 2·4 parts of boiling water. The dioxide, SrO_2, is prepared by action of hydrogen dioxide on strontia-water.

The salts of S. resemble those of barium in their general characters, and in their being precipitated from their solutions by sulphuric acid and the soluble sulphates; but they differ from them in not being thrown down by silico-fluoric acid or hyposulphite of soda, and in their communicating to the flame of the spirit-lamp and to burning substances generally, a brilliant purple-red color. *S. Carbonate,* $SrCO_3$, occurs native both massive and crystalline, and may be obtained artificially as a white powder by precipitating a soluble salt of S. with carbonate of soda. *S. Sulphate,* $SrSO_4$, occurs native in *Celestin*, a mineral found in rhombic prisms and fibrous masses in Sicily. *S. Nitrate,* $Sr(NO_3)_2$, separates from a hot concentrated solution in large colorless transparent anhydrous octahedral crystals, which dissolve freely in water. By addition of nitric acid, it is precipitated from its aqueous solution. Its chief use is in pyrotechny. A mixture of 800 grains of nitrate, 225 of sulphur, 200 of potassium chlorate, and 50 of lampblack, deflagrates with magnificent red color, and constitutes what is popularly known as *Red Bengal Fire;* but the mixture is dangerous both to prepare and to preserve, having occasioned frightful accidents to the manufacturers from spontaneous ignition.

The most important of the haloid salts of S. is the *Chloride,* $SrCl_2$, which may be obtained in crystals containing six equivalents of water. The water is expelled at moderate heat, leaving the chloride anhydrous. The chloride is the only salt from which the metal has been obtained.

Strontia was discovered as an independent substance almost simultaneously by Hope and by Klaproth 1793. In 1807, Davy obtained barium and S. from their oxides, but not pure; and 1855 Bunsen and Matthiessen succeeded in procuring perfectly pure specimens of the metal.

STROP, n. *strŏp* [same as STRAP, which see: Sw. *stropp*, a strap: It. *stroppa*, an osier to bind fagots: L. *struppus*, a thong]: a strip of leather, or flat prepared substance, on which razors are sharpened: V. to sharpen on a strop. STROP'PING, imp. STROPPED, pp. *strŏpt*.

STROPHE, n. *strō'fē* [Gr. *strophē*, a turning—from *strephō*, I turn: It. *strofa;* F. *strophe*]: in the *Greek drama*, that part of a song or dance which was performed in *turning* from the right to the left of the orchestra; the first of two stanzas. STROPH IC, a. *-ĭk*, pertaining to strophes.

STROPHIOLE, n. *strŏf'ĭ-ōl* [L. *strophiŏlum*, a little garland or chaplet—from *strophium*, a band or wreath—from Gr. *strephō*, I twist]: in *bot.*, a swollen fungus-like excrescence on the surface of some seeds about the hilum. STROPH IOLATE, a. *-ō-lāt*, furnished with a garland, or its resemblance; in *bot.*, having little fungus-like excrescences around the hilum.

STROPHULUS, n. *strŏf'ū-lŭs* [mid. L. *strophulus*—from Gr. *strophos*, a twisted band or cord—from *strephō*, I turn]: in *med.*, papular eruption of various forms, peculiar to infants: see RED-GUM.

STROSSMAYER, *stros'mī-ĕr*, JOSEPH GEORG, PH.D., THEOL.D.: b. Essek, Slavonia, 1815, Feb. 4: Rom. Cath. bp. of Bosnia and Servia, including Croatia. He was educated at the Univ. of Pesth, consecrated priest 1838, was prof. in the Diakovar Seminary, and court-chaplain; and was made bp. 1849. He led the national party, was sent to the Austrian reichsrath 1860, and did much to promote Croatian and Austrian unity. At the Vatican council he opposed the dogma of papal infallibility; though at the end yielding his judgment to what he deemed the superior authority of the Roman see. Besides his many patriotic writings of popular cast, he published *Monumenta Slavonorum Meridionalium* (1863).

STROTHER, *strŏth'ĕr*, DAVID HUNTER: writer and designer: 1816, Sep. 16—1888, Mar. 8, b. Martinsburg, Va. (now in W. Va.). Having studied drawing under Samuel F. B. Morse in New York, he spent 5 years in travel in Europe 1840–45. Returning to New York, he became a designer on wood, and 1848 retired to his native place. Thence he contributed to *Harper's Magazine* a series of papers illustrated with his own original designs, and signed 'Porte-Crayon:' many of these papers were afterward reprinted in the two vols., *Blackwater Chronicle* (1853) and *Virginia Illustrated* (1857). During the civil war S. served in the Federal army, attaining the rank of col.; and was brevetted brig.gen. of vols. 1865. He was thereafter a frequent contributor of sketches to magazines. S. was U. S. consul-gen. in Mexico 1879–85.

STROUD, n. *strowd:* a kind of coarse blanket used by the N. Amer. Indians. STROUD'ING, n. a kind of coarse cloth employed in trading with the N. Amer. Indians. STROUDS, n. plu. among *seamen*, the several twists at the end of a cable or rope.

STROUD, *strowd:* small manufacturing and market town of Gloucestershire, England; nine m. s s.e. of Gloucester, in a beautiful and extensive valley, where the Frome and Slade unite to form the Stroudwater or Frome. It is the centre of the woolen manufacture of Gloucestershire, and contains a number of woolen and silk mills. The water of the Frome is peculiarly adapted for use in dyeing scarlet and other grain colors; and cloth-factories and dye-works line its banks for 20 m.—Pop. (1881) 9,535; (1891) 9,818.

STROUSBERG, *strowss'bĕrg,* BETHEL HENRY (originally BARUCH HIRSCH STRAUSBERG): financier: 1823, Oct. 20—1884, May 31; b. Neidenburg, Prussia; of Jewish parentage. Losing his parents in his 12th year, he went to England and became a Christian. In London he was at first employed in the office of his uncles, commission merchants, but began to write for the press, and became proprietor of Sharpe's *London Magazine.* He also engaged in the business of life-insurance. He failed financially 1847, and settled in New Orleans, where he soon by speculation accumulated enough money to start in business again in London 1849. He visited Berlin 1855, and helped to organize the E. Prussian Railway Co. He settled in Berlin 1861, and began building railroads in Germany, Austria, etc. He purchased a vast estate in Bohemia, great locomotive works in Hanover, besides quarries, mines, etc.; he established beet-sugar works, porcelain factories, a cattle-market at Berlin, and engaged in many other vast enterprises. The crash came 1870, when the Roumanian railway had to pass payment of its coupons. S. was confined in prison at Moscow 1875–77. While in prison he wrote *Dr. S. und sein Wirken.* He died in Berlin in great poverty.

STROVE, v. *strōv:* pt. of STRIVE, which see.

STROW, v. *strō:* same as STREW, which see. STROWED, pt. *strōd.* STROWN, pp. *strōn.*

STRUCK, v. *strŭk:* pt. of STRIKE, which see.

STRUCTURE, n. *strŭk'tūr* or *-chūr* [F. *structure*—from L. *structūrā,* a fitting together, construction—from *structus,* piled up; *struĕrĕ,* to pile up]: manner of building; make; form; manner of organization; a building of any kind; an edifice; that form or condition in which the component parts of minerals or rock-masses are arranged as in a granite quarry we find the rock arranged in large tabular or square-like masses—*texture* referring to the manner in which the component particles are internally arranged, as we find a piece of granite hard, close-grained, and crystalline. STRUC'TURAL, a. *-tūr-ăl,* of or pertaining to structure.

STRUENSEE, *strō'ĕn-zā,* JOHANN FRIEDRICH, Count: Danish statesman, of German descent: 1737, Aug. 5—1772, Apr. 28; b. at Halle on the Salle, where his father, Adam S., was pastor. He studied medicine, and when scarcely 19 years old passed as doctor. Early alienated from positive Christianity, he became a disciple of Helvetius and Voltaire. Removing to Altona, then in Denmark,

he was soon appointed travelling physician to the feeble young king, Christian VII.; and, on their return from a tour, physician in ordinary. At first, the young queen, Caroline Matilda, sister of George III. of England, regarded him with mistrust; but from 1770 gave him her confidence, intrusted him with the education of the crown-prince, and by degrees made him the confidant of her unhappy position. S. was appointed reader to the king, and private sec. to the queen. Since the revolution of 1660, Denmark had been under the domination of the nobility as a council of state. S. saw the disadvantages of this system, and availed himself of his position to introduce reform; first procuring the dismissal of the favorite Holck, in whose stead his friend Brandt was appointed. S. then caused to be proclaimed the freedom of the press. The council of nobles was dissolved, and a proclamation issued to the effect that the royal power, as in olden times, was to be re-established. The queen and S., in whose hands the actual government now was, chose new ministers, and excluded the almost imbecile Christian from management of affairs. These measures amounted to a revolution. In 1771, July, S. received the title of Cabinet Minister, with unlimited power. He endeavored to free Denmark from Russian influence, and to find a natural ally in Sweden. In internal affairs his changes were directed to the advancement of prosperity, of civil liberty, and of public enlightenment. He put the finances in order, reduced expenditure, liberated industry and trade, encouraged education, mitigated the penal laws, brought order into the administration, and 1771 enfranchised the peasantry. All these reforms, still operative in the Danish dominions, were excellent; but the hasty and impolite manner of their introduction gave them the appearance of tyranny. As they were democratic in tendency they aroused the nobles to antagonism. Also, S. made a great mistake in recklessly obtruding his infidel philosophy in the face of the strict orthodox clergy and the pious prejudices of the people.

S. had scarcely been in power a year when the symptoms of reaction appeared in all quarters. The queen gave birth to a daughter 1771, which, in the condition of the king, occasioned scandalous reports. S. declined the British ambassador's advice to take refuge in England. At the head of the hostile party was the queen-dowager, who was impatient of the domination of the queen and S. From her apartments, the conspirators, through a secret door, entered the bedroom of the king, and compelled him to sign 15 warrants of arrest, among others for S. and for the queen, who were then taken prisoners. S. was put in chains, and brought to the citadel. He was accused of various crimes, none of which could be legally proved. In a second examination, however, S., with tears, confessed to improper intercourse with the queen; but some of his contemporaries affirm that the confession was made only under threat of torture. A commission to examine the queen failed to extort the slightest confession of guilt. When one of the commissioners at last remarked that if

she made S. guilty of falsehood, he would be put to a disgraceful death for slandering majesty, the queen seized a pen, and began to sign a paper which contained confession of her guilt. She had not finished when she sank in a swoon; and it is said that some one put the pen in her hand, and, guiding it, finished the name. S. was found guilty of a great and capital crime, and sentenced to a cruel death. It was wished by some to proceed further against the queen; but the British ambassador threatened the appearance of a British fleet. The death-sentence on S., and on his friend Count Brandt, was executed amid the rejoicings of the multitude. In the prospect of death, S. is said to have returned to the Christian faith. There is no reason to doubt that he did not deserve such fearful fate, but that he fell a sacrifice to the party of the nobles. Queen Caroline Matilda left Denmark 1772, May, and died of grief 1775, in the castle of Celle in Hanover.

See works on S. by Höst, Falkenskjöld, Münter, Janssen-Tusch (1864), and Schiern (1871); and the tragedies by Beer and Laube.

STRUGGLE, v. *strŭg'gl* [Dan. *stryg*, a beating; *stryge*, to strike: Dut. *struikelen;* Low Ger. *strükeln;* Ger. *straucheln*, to stumble: see STRIKE, of which this is a frequentative]: to use violent efforts with twistings of the body: to use great efforts or exertions; to writhe; to strive; to contend; to labor hard: N. violent efforts with twistings of the body; great efforts to attain an object or to avoid an evil; contest; strife; agony; contortions of extreme distress. STRUG'GLING, imp. *-glĭng:* ADJ. making great efforts; affected with contortions: N. vehement or earnest effort. STRUGGLED, pp. *strŭg'gld.* STRUG'GLER, n. *-glĕr*, one who struggles.

STRUGGLE FOR EXISTENCE: see DARWINIAN THEORY: ETC.

STRUM, v. *strŭm* [Sw. *trumma*, to beat, to drum: Ger. *strampfen*, to make a clattering motion with the feet: It. *strimpellare*, to scrape or play badly on an instr.]: to thump or make a noise; to play badly on an instr.; to play in a coarse noisy way, as on a piano. STRUM'MING, imp.: N. the persevering practice of a learner on a stringed instr. STRUMMED, pp. *strŭmd.*

STRUMA, n. *strō'mă* [L. *strūma*, a scrofulous tumor—from *struĕrĕ*, to pile up]: a diseased state characterized by a tendency to a swelling of the glands in various parts of the body; a scrofulous swelling or tumor; scrofula or king's evil. STRU'MOUS, a. *-mŭs*, or STRU'MOSE, a. *-mōz*, or STRUMATIC, a. *strō-măt'ĭk*, having struma; scrofulous.

STRUMPET, n. *strŭm'pĕt* [OF. *strupe, stupre*—from L. *stuprum*, concubinage]: a prostitute: ADJ. in *OE.*, like a strumpet; inconstant; false: V. in *OE.*, to make a whore; to debauch.

STRUNG, v. *strŭng:* pt. and pp. of STRING, which see.

STRUT, v. *strŭt* [Ger. *strotzen*, to be swollen or puffed out: Dan. *strutte*, *strude*, to strut: Low Ger. *strutt*, rigid, stiff]: to walk with affected dignity: N. a lofty proud step or walk with the head erect; affected dignity in walking. STRUT'TING, imp.: N. the act of walking in an affected manner. STRUT'TED, pp. STRUT'TER, n. *-tĕr*, one who struts. STRUT'TINGLY, ad. *-lĭ*.

STRUT, n. *strŭt* [Sw. *streta*, a support: prov. Dan. *stred*, a strut]: in *arch.*, a piece of timber set slanting as support to a beam; straining piece of timber in a roof used to strengthen the principal truss.

STRUTHION'IDÆ: see OSTRICH.

STRUVE, *strō'vĕh*, FRIEDRICH-GEORG-WILHELM: astronomer: 1793, Apr. 15—1864, Nov. 23; b. Altona, then in Denmark. He was educated at the Univ. of Dorpat (Russia), and appointed to a post in the observatory there 1813. He became director of the Dorpat Observatory 1817, and by his assiduous observations and researches respecting double and multiple stars earned repute as one of the most skilful of practical astronomers. His telescope was a Fraunhofer's (q.v.) refractor, of 10 inches aperture and 13½ ft. focal length; and with this, in gleaning from the depths of space the materials for his three important works on double stars (1822 and 28, 1837 and 40, 1852), he examined no fewer than 120,000 of these stars. His investigations led him to the conclusion that the number of true double stars is much larger than was previously supposed (see STARS). S. also executed important geodetic operations, e.g., the measurement of an arc of the meridian in the Baltic Provinces, 1822–27; which was (1828–56) extended by him, with Hansteen (q.v.) and Selander, to the North Cape; and by Gen. Tenner southward to Ismail in Turkey. This, the most extensive trigonometrical operation ever performed, gave the length of a meridian arc of 20°, and enabled geometers to determine with increased accuracy the exact form of the earth. Meanwhile, S. had been appointed, 1839, director of the best-organized observatory in the world, that of Pulkova (q.v.), and also chosen *correspondant* in the astronomical section of the Acad. of Sciences of Paris. He died at St. Petersburg.—His son, OTTO-WILHELM S. (b. Dorpat, 1819, May 7), eminent astronomer, was educated under his father's direction, became his chief assistant at Pulkova, and his successor as director of the observatory. His astronomical discoveries are numerous, among which are more than 500 new double stars, and (1847) a satellite of Uranus. Of his many important papers, most notable are those giving his researches on the inner or dusky ring and on the variation in breadth of the bright rings of Saturn, and on the periodic motions of double stars.

STRYCHNINE, n. *strĭk'nĭn*, or STRYCH'NIA, n. *-nĭ-ă* [Gr. *struchnos*, a kind of nightshade]: a vegetable alkaloid, active principle of *Strychnos nux vomica*, a deadly poison, but in minute quantities a valuable medicine. STRYCH'NIC, a. *-nĭk*, pertaining to strychnine.

STRYCHNOS, *strĭk'nŏs:* genus of trees of nat. order *Loganiaceæ*, having a five-lobed calyx, a tubular funnel-shaped or salver-shaped corolla, with a five-partite limb, five stamens, a filiform style, numerous ovules, and a one-celled berry, with a leathery rind, many-seeded, or, by abortion, one-seeded, the seeds discoidal and compressed. To this genus belongs the *S. nux vomica*, tree of medium size, with ovate stalked leaves, native of India. Its fruit is produced in great abundance, and is about the size of a small orange; the seeds are the *Nux Vomica* of commerce, and yield *Strychnine:* see NUX VOMICA: POISONS. The bark partakes of the poisonous quality of the seeds. The wood of the tree is very hard and durable. The Clearing-nut (q.v.) and St. Ignatius' Bean (q.v.) are produced by species of this genus, to which belongs also the tree (*S. toxifera*) which produces the Woorali or Curare (q.v.) poison of S. America. Another species is the UPAS TIEUTÉ (*S. Tieute*) of Java, large climbing shrub, whose bark is extremely poisonous, containing a very large quantity of strychnine. The wood of a species found in n. India (*S. colubrina*), which is also a climber, is an imaginary cure for snake-bites. The bark of *S. pseudo-quina*, a Brazilian species, is used as substitute for cinchona.

STRYKER, *strīk'ĕr*, MELANCTHON WOOLSEY, D.D., LL.D.: educator: 1851, Jan. 7— ————; b. Vernon, N. Y. He graduated at Hamilton Coll. 1872, and at Auburn Theol. Sem. 1876; was ordained Presb. minister the latter year; held (Presb.) pastorates in Auburn, N. Y., 1876–78; Ithaca, N. Y., 1878–83; Holyoke, Mass., (Congl.), 1883–85; Chicago 1885–92. In 1892 he was elected ninth pres. of Hamilton Coll. He received his degrees from Lafayette and Hamilton Colls. 1889. Among his publications are: *The Alleluia* (1880); *Church Praise Book* (1881); *Christian Chorals* (1885); *Church Song* (1888); *Song of Miriam and Other Verses* (1888); *Choral Song* (1891); and *Essays on the Dies Iræ*, with translations (1892).

STRYPE, *strīp*, JOHN: voluminous ecclesiastical historian: 1643, Nov. 1—1737, Dec. 11; b. London. He studied at Cambridge, entered the Anglican priesthood, and held for many years, together with smaller livings, the rectory of Low Leyton, Essex. His works fill 13 large folio vols. The most important are: *Memorials of Archbishop Cranmer* (1694); *Life of Sir Thomas Smith, Secretary of State to Edward VI. and Elizabeth* (1698); Lives of *Bishop Aylmer* (1701), *Sir John Cheke* (1705), *Archbishop Grindal* (1710), *Archbishop Parker* (1711), and *Archbishop Whitgift* (1718); *Annals of the Reformation* (I. 1709, II. 1723, III. 1728, IV. 1731); *Ecclesiastical Memorials*, relating to religion and the Church of England under Henry VIII., Edward VI., and Queen Mary, 3 vols., folio, 1721—his best work, forming, with Burnet's more readable *History of the Reformation*, a consecutive and full account of the reformed Anglican Church. As a writer, S. is heavy, but honest and plodding; and he was a faithful transcriber of the ancient papers that he published, all which, he says, were copied with his own hand.

STU'ART, ARABELLA (or ARBELLA), Lady: see STUART, ROYAL HOUSE OF.

STUART, *stū'ërt*, CHARLES EDWARD LEWIS CASIMIR, often called the younger Pretender: 1720, Dec. 31—1788, Jan. 31; b. Rome; eldest son of James Francis Edward, Prince of Wales, known as the elder Pretender or Chevalier St. George (see STUART, ROYAL HOUSE OF), and of his wife Clementina Sobieski, granddaughter of the celebrated Polish monarch John Sobieski. S. bore among the Jacobites (q.v.) the title Prince of Wales. He served under Don Carlos in Spain, and is described as having been in his youth handsome, affable, and engaging in manners. In 1743, 28 years after his father's unsuccessful attempt to regain the British crown, a scheme was contrived in France, with the support of the Jacobites in England, by which S. was to recover the throne of Great Britain for his family. The first contrived project was to land an army in Kent, where were many adherents of the exiled house; and troops to the number of 15,000 were assembled, and transports provided at Boulogne, Dunkirk, and Calais, to carry them to England. But the squadron which was to have convoyed the transports fled before the British fleet under Sir John Norris; a storm destroyed the transports, and many of the troops were drowned. S., however, only awaited a favorable opportunity for a fresh attempt. 1745, July, when George II. was in Hanover, and Scotland almost without military, he sailed from Nantes, in company with the Marquis of Tullibardine and a few other devoted followers; and having landed in n. Scotland and summoned the Highland clans, which were devoted to the Stuart cause, he marched southward ten days later at the head of a large body of hardy mountaineers. Government offered a reward of £30,000 for the apprehension of the Pretender's son, who retaliated by offering a like reward for the apprehension of the Elector of Hanover—meaning King George II. At Perth, the insurgents were joined by the Duke of Perth and Lord Strathallan, with a numerous retinue; and on their approach, Edinburgh surrendered without resistance. S. took up his residence at Holyrood Palace, where he proclaimed his father king of Great Britain, and himself regent.

Meanwhile, Sir John Cope, commander-in-chief of the king's troops in Scotland, encamped at Prestonpans. He was there unexpectedly attacked by the Highlanders, and ignominiously routed. S., contrary to the advice of his council, advanced into England, though his force scarcely exceeded 6,500 men. Carlisle surrendered, and he proceeded as far as Derby. In the mean time, three English armies, each larger than his own, were preparing to meet him. Unable to raise recruits in England, he retreated into Scotland, hoping to meet a reinforcement under Lord John Drummond. On their way north, the Highlanders were pursued by the Duke of Cumberland, whom they defeated near Penrith. Finding Edinburgh in possession of the king's troops, S., joined by Lord John Drummond and Lord Strathallan, made his way to Stirling: the town sur-

rendered, and he laid siege to the castle. Gen. Hawley, endeavoring to raise the siege, was routed by Lord George Murray, at the head of the Macdonalds of Keppoch. But the advance of the Duke of Cumberland compelled the rebels to retreat further north. 1746, Apr. 16, the Duke of Cumberland encountered S.'s army on Culloden Moor. The Highlanders at first rushed boldly forward; but on the advance of the royal infantry, they gave way; the battle soon became a rout, and the fugitives were slaughtered by the dragoons, who gave no quarter. The rebels lost that day at least 1,000 men. S. escaped to the Hebrides, hunted by the king's troops; disguised in woman's attire, he was conveyed to Skye in an open boat by Flora Macdonald, daughter of Macdonald of Milton. For months he wandered in concealment among the mountains of Skye and the mainland, where he had many hair-breadth escapes; and though his secret was known to hundreds of the poorest of the people, no one was tempted by the £30,000 reward to betray him. He eventually escaped to France, and no further attempts were made to reinstate the exiled family.

S. remained in France till the peace of Aix-la-Chapelle (1748). It was a condition of that treaty that France should abandon the cause of the Stuarts; and as he refused to quit France, he was conducted with a guard out of the kingdom, and retired to Rome.

He married, 1772, Louisa Maximiliana de Stolberg-Guedern, daughter of Gustavus Adolphus, Prince of Stolberg-Guedern. The union was not happy, and the princess withdrew from him: see ALBANY, COUNTESS OF. In his latter years he was addicted to intoxication. When his claims ceased to be supported by any foreign power, he dropped the title Prince of Wales, and assumed that of Count of Albany. He died at Rome, and was buried at Frascati. There was no issue of his marriage.

Two brothers, generally known as John Sobieski S. and Charles Edward S., endeavored to persuade the world that they were legitimate grandsons of S. In fact they were sons of Capt. Thomas Allen, R.N., and grandsons of Admiral John Carter Allen, who died 1800. Their story was, that their father, instead of being Admiral Allen's son, was a son of S. and the Princess Louisa, whose birth was kept secret, from fear of the Hanoverian family, and who was intrusted to Admiral Allen, and passed off by him for his own son.

STUART, *stū'ėrt*, GEORGE HAY: b. England, 1816, Apr. 2: benevolent merchant in Philadelphia. He came to this country in his 15th year. In the civil war he was pres. of the U. S. Christian Commission, and was a prominent promoter and often presiding officer of the Young Men's Christian Assoc. conventions, and an officer in the Bible, Tract, and Sunday-school societies. He was on the first board of U. S. Indian commissioners, after declining a cabinet place under Pres. Grant. He was a large giver to benevolent objects, and was noted in his Presb. denomination as an opponent of rigidity and exclusiveness. He d. 1890, Apr. 11.

STU'ART, Gilbert Charles: painter: 1755, Dec. 3—1828, July 27; b. Narragansett, R. I.; of Scotch descent. The family removed to Newport, where he was well educated. In his boyhood he went to Edinburgh with a Scotch painter named Alexander, with whom he studied his art; but, his master dying, he worked his passage home in a collier, and began to paint portraits at Newport. In 1775 he made his way to London, where he led for two years a Bohemian life; but his talent was recognized by his countryman Benjamin West, pres. of the Royal Acad., who took him as pupil and assistant into his family, and whose full-length portrait he painted for the National Gallery. In 1785 he opened his studio in London, and painted the portraits of George III., the Prince of Wales, the Duke of Northumberland, Sir Joshua Reynolds, John Kemble, and many other celebrated characters. He also made a professional visit to Dublin, and in Paris painted a portrait of Louis XVI. He married in London; and 1792, in the fulness of his powers and fame, he returned to the United States, and painted portraits of Washington, Jefferson, and many distinguished men; and began a portrait of John Quincy Adams, which at his death was finished by Sully. After residing about 11 years in Philadelphia and two years in Washington, he removed 1805 to Boston, where he died.—The first head of Washington painted by Stuart was in 1795; it gives the right side of his face, and is thought by some to be the most faithful portrait of the subject. The second was a full-length ordered by the Marquis of Lansdowne; and the third a head, upon an unfinished background, now in the Boston Athenæum—these two presenting the left side of the face. The last mentioned is the one that has been copied usually in book engravings and on U. S. notes and stamps; hence it has become the accepted image of Washington, though differing as much from portraits and busts of the same subject by other artists as these differ from each other. Stuart painted more than 60 copies of his Washington portraits. He is regarded as a leading master of his art, especially in modelling and in fresh, vital, permanent coloring.

STU'ART, James Ewell Brown: soldier: 1833, Feb. 6—1864, June 12; b. Patrick co., Va. He graduated from West Point 1854; served as a mounted rifleman in Texas, and became noted as an Indian fighter; was with his regt. during the border troubles in Kan. 1856; afterward engaged in quelling Indian disturbances, and was severely wounded; and aided in suppressing the John Brown raid in Va. 1859. By promotions he reached the rank of capt. 1861, Apr. 22; but resigned his commission in order to serve his native state under the Confederate govt. He soon became col. of the Va. cavalry, and was connected with the army of Gen. J. E Johnston. He rendered efficient service at the battle of Bull Run; made numerous brilliant cavalry raids, was prominent in the seven days' battle before Richmond 1862, at the second battle of Bull Run, at South Mountain, Antietam, and Fredericksburg; made a raid on Dumfries and learned the plans of the

Union officers by sending forged telegrams to Washington; and after his superior officers were disabled was in command of Stonewall Jackson's corps at Chancellorsville, and managed his troops with great skill. In the Gettysburg campaign he made a raid in the rear of the Union forces which occupied so much time that the great issue was decided before he reached the field: the responsibility for this movement has been variously assigned. After several engagements with the Union cavalry, he was mortally wounded at Yellow Tavern while attempting to prevent Gen. Sheridan's troops from reaching Richmond. He was promoted brig.gen. 1861, and maj.gen. 1862, July 25. He died at Richmond.

STU'ART, Moses: biblical scholar and author: 1780, Mar. 26—1852, Jan. 4; b. Wilton, Conn. At 12 years of age he read Edwards's *Freedom of the Will*, and three years afterward 'learned the whole Latin grammar,' such as was then in use, in three days. Entering Yale as a sophomore 1796, he was the foremost scholar in his class. After teaching in N. Fairfield and Danbury, Conn., he began the study of law, but, while tutor at Yale, abandoned it for theology, and was ordained as pastor of the First Church (Congl.) in New Haven, 1806, where his remarkably eloquent ministry of nearly four years was signalized by large additions to the church. In 1810 he was inaugurated prof. of sacred literature in the Andover Theol. Seminary, which position he filled till 1848. During this period he wrote a *Grammar of the Hebrew Language*, without points, setting up a part of the type himself. He was 'a pioneer in the introduction of German literature into this country.' Notwithstanding his feeble health, he published numerous translations and original works, among which are: *Letters to the Rev. W. E. Channing; Hebrew Grammar*, with points (based on Gesenius); *Commentaries on the Epistle to the Hebrews* and the *Epistle to the Romans;* on the books of *Ecclesiastes, Proverbs, Daniel*, and the *Apocalypse; Hebrew Chrestomathy; Essay on the Liquor Traffic; Essay on Christian Baptism; Hints on the Prophecies; Conscience and the Constitution*—manifesting in all acuteness, vigor, and versatility. He died at Andover.

Prof. S.'s influence on biblical and linguistic scholarship in this country can scarcely be overrated. The wonderful vigor of his mind was an inspiration to successive classes of students: his teaching and his numerous writings opened a new era. In Europe also, where American scholarship then had little repute, he was accorded high rank. The fact is certainly notable that the degree D.D. is not known to have been conferred on him.

STUART (or STEUART, or STEWART), ROYAL HOUSE OF: renowned family, some of whose branches rose to the throne of Scotland, and ultimately to that of England. The origin of the family bearing this surname was long obscured by myth, but was rediscovered in the beginning of the 19th c.—Alan, son of Flahald, a Norman, accompanied the Conqueror into England, and obtained by his gift the lands and castle of Oswestry in Shropshire. His eldest son, William, remaining in England, became ancestor of the Fitzalans, Earls of Arundel, from whom the Duke of Norfolk inherits that earldom through an heiress. The second son, Walter, passing into Scotland in the service of David I., had large territorial possessions conferred on him by that monarch, with the dignity of Steward of Scotland, which became hereditary in his family, and was assumed by his descendants as a surname; some branches of the house, when spelling began to be considered, modifying the orthography to Steuart, or the French form Stuart. See STEWARD. The fess chequy adopted as the arms of the family is emblematical of the chequer of the steward's board. The connection between the Stewarts and Fitzalans was shown by the antiquarian, George Chalmers, to have been acknowledged as late as 1336.

The lands conferred on Walter the Steward by David I. included the barony, now the county of Renfrew, which became the chief patrimony of the family. For seven generations the stewardship descended without a break from father to son.—Walter, the third, and grandson of the first steward, held, in addition, the office of justiciary of Scotland.—His third son, Walter, called Balloch, by his marriage with the younger daughter of Maurice, Earl of Menteith, got the earldom of Menteith, and was ancestor of a line of earls and countesses of Menteith, of whom the Countess Margaret carried the earldom to her husband, Robert, Duke of Albany, son of King Robert II.—Alexander, fourth steward, was regent of Scotland in Alexander III.'s minority. From his second son, Sir John Stewart, who married the heiress of Bonkyl, sprang various important branches of the family, including the Stewarts of Darnley, Lennox, and Aubigné.—James, fifth Steward, was one of the six regents of Scotland after the death of Alexander III. —Walter, sixth steward, was conspicuous among Bruce's companions-in-arms; his marriage with Marjory, daughter of Robert Bruce, eventually brought the crown of Scotland to his family. His death at the age of 33 was lamented throughout Scotland.—His son by Marjory Bruce, Robert, seventh high steward, was regent 1338–41, and 1346–57; and in the midst of events which threatened overthrow to the liberties of Scotland, he exerted himself in their defense. On the death of David II. 1371, he ascended the throne as Robert II.; and died 1390. Of the children by his first marriage (legitimated by the pope's dispensation 1347), the third son, Robert, Duke of Albany, and his issue are noticed be-

low. The fourth son, Sir Alexander Stewart, who got the earldom of Buchan on the forfeiture of the Comyns, ruled n. Scotland with little less than regal authority, and, from his savage and ferocious character was called the 'Wolf of Badenoch.' Some of his natural sons were progenitors of the Athole Stewarts.—For the subsequent history of the royal family, see ROBERT II.: ROBERT III.: JAMES I.: JAMES II.: JAMES III.: JAMES IV.: JAMES V.: MARY, QUEEN OF SCOTS: JAMES I. (of England): CHARLES I.: CHARLES II.: JAMES II.: WILLIAM AND MARY: ANNE.

James II. (of England) was twice married; first to Lady Anne Hyde, daughter of Lord Chancellor Hyde; secondly, to Mary Beatrice, daughter of the Duke of Modena. By the first marriage he had Mary, queen of William III., and Anne who succeeded to the throne, neither of whom left issue; and by the second, James, Prince of Wales (1688–1766): known as the Chevalier St. George or the elder Pretender. Prince James, born but a few months before his father's abdication, was commonly but groundlessly alleged to be a supposititious child, and was involved in his father's exclusion from the crown. In 1715, the party who supported him, known in history as the Jacobites (q.v.), endeavored to procure him the throne by force of arms. In Scotland, the Earl of Mar, with about 5,000 men, engaged the royal forces under the Duke of Argyll at Sheriffmuir: it was a drawn battle, but the result was a delay as fatal as a defeat. In England the rising was headed by the Earl of Derwentwater, and ended by the unconditional surrender of the insurgents at Preston, when Lords Derwentwater and Kenmure were beheaded, and other persons of note were put to death and attainted. James escaped to France; and for the rest of his life resided in obscurity, principally at Rome, where he died. In 1719, he married one of the wealthiest heiresses in Europe, Maria Clementina Sobieski, granddaughter of John Sobieski, King of Poland; and by her he had two sons, Charles Edward Lewis Casimir (b. 1720), known as the Young Pretender (see STUART, CHARLES EDWARD); and Henry Benedict Maria Clement, Cardinal York (1725–1807). Henry Benedict, second son of the Chevalier St. George, went to France 1745 to head an army assembled at Dunkirk for invasion of England; but the news of the defeat of Culloden put an end to his plan. He then returned to Rome, took orders in the church, and was advanced to the purple by Benedict XIV. 1747. During his older brother's life, he was known as Cardinal York; but after his death he assumed the regal style as Henry IX., King of England. His various bishoprics and rich church livings long enabled him to live in great splendor; but the expulsion of Pius VI. from Rome, and other events of the Revolution, drove him to Venice, aged and infirm, and in absolute poverty. The cardinal's deplorable situation becoming known to the British court, George III. settled on him an annuity of

£4,000. He died at the age of 82, last surviving descendant of James II.

Next to the exiled Stewarts in representation of the royal house as heir-of-line came the descendants of Henrietta Maria, daughter of Charles I., who was married to Philippe, Duke of Orleans, brother of Louis XIV. of France. This princess had two daughters, of whom the elder, Mary, was queen to Charles II. of Spain, but died childless; the younger, Anna Maria, married Victor-Amadeus, Duke of Savoy and King of Sardinia; and was mother to Charles-Emmanuel III., King of Sardinia, and grandmother to Victor-Amadeus III., King of Sardinia.—Victor-Amadeus had three sons who successively occupied the Sardinian throne as Charles-Emmanuel IV., Victor-Emmanuel I., and Charles-Felix; and a daughter who married Charles X. of France, and was mother of Henri, Duc de Bordeaux, representative of the French Bourbons.—Victor-Emmanuel and Charles-Felix left daughters only; and the senior co-representative as heir-of-line of the House of S., as well as that of Tudor, in recent years has been Maria Teresa, wife of Prince Louis of Bavaria and only child of the younger brother of the last Duke of Modena, grandson of Victor-Emmanuel IV. The house of Savoy-Carignan, from which the king of Italy springs, does not participate in the S. descent.

The branch of the family which the parliamentary settlement called to the British throne on the death of Anne were descendants of the Electress Sophia of Hanover, granddaughter of James VI. by her mother, the Princess Elizabeth Stewart, Electress Palatine and Queen of Bohemia. By this destination, not only were the already-mentioned descendants of Charles I.'s daughter, the Duchess of Orleans, excluded, but also the sons of the king of Bohemia and their descendants. The eldest son, Charles Lewis, Duke of Bavaria, is represented through his daughter, Duchess of Orleans, by the Comte de Paris, grandson of Louis Philippe, late king of the French. Queen Victoria is sixth in descent from and representative of the Electress Sophia—the line of descent being through George I.; George II.; Frederick, Prince of Wales; George III.; and Edward, Duke of Kent.

We have now to notice the most important cadets of the House of Stewart.

Dukes of Albany, Earls of March, Lords of Annandale and Man.—The dukedom of Albany was conferred on Alexander, second son of King James II. of Scotland, who also obtained the earldom of March, and lordship of Annandale and Man. Albany, falling under suspicion of James III., was arrested, and escaping to France, was attainted. He afterward took part in a plot with the discontented barons and Edward IV. of England to place himself on the throne, and joining the English army, captured Berwick. After making his peace with James, and being restored to his dukedom, he again rebelled, and invading Scotland with the Earl

of Douglas, was routed at Lochmaben, and once more attainted. By his second wife, daughter of Bertrand, Count de la Tour d'Auvergne, he had a son John, who was restored to the dukedom, assumed the regency of Scotland in James V.'s minority, and was declared heir to the throne, but did not survive James V.: he d. 1536.

Dukes of Albany, Earls of Fife and Menteith.—Robert, second surviving son of Robert II. and Elizabeth Mure, obtained the earldom of Menteith by marriage with its heiress, and the earldom of Fife by indenture with his sister-in-law, the countess, and was appointed great chamberlain of Scotland 1383. He practically exercised the regency during his father's declining years, and continued to wield the supreme authority after the succession of his timid and irresolute brother, Robert III., who bestowed on him the title Duke of Albany—i.e., of all Scotland n. of the Forth and Clyde. His unscrupulous ambition led him to make riddance of his nephew, Duke of Rothesay, by starving him, to pave his own way to the thro e. On Robert III.'s death, Albany at once became regent of Scotland, and wielded the chief power of the state during the minority and captivity of James I. By his first marriage to Margaret, Countess of Menteith, he had a son, Murdoch, who, on his father's decease 1419, succeeded to the regency. Duke Murdoch married the eldest co-heiress of the Earl of Lennox, and had four sons. On James I.'s restoration, his vengeance fell on Duke Murdoch, his sons Walter and Alexander, and his father-in-law, Lennox, who all were put to death, and the dukedom of Albany forfeited to the crown.

Lords Avandale, Ochiltree, and Castlestuart; Earls of Castlestuart.—Andrew Stewart, grandson of Murdoch, Duke of Albany, was created Lord Avandale 1455, and was chancellor to James III. His nephew Andrew became 1488 second Lord Avandale. Andrew, third Lord Avandale, exchanged his title for that of Ochiltree; and was father of Andrew, second Lord Ochiltree, one of whose daughters became the second wife of John Knox. His younger son, James, was the unprincipled and arrogant favorite of James VI.'s early years; was chancellor of Scotland; was created Earl of Arran on the forfeiture of the Hamilton family; and enriched himself with the spoils of the estates of Angus, and other forfeited lords. But in 1585 he was stripped of his honors, offices, and spoils. Andrew, third Lord Ochiltree (grandson of the second lord), resigned the lordship of Ochiltree to his cousin, Sir James Stewart of Killeith, son of the Earl of Arran; and settled in Ireland, where extensive lands were bestowed on him by James VI., and 1619 was created Lord Stuart of Castlestuart in the peerage of Ireland. In 1800 Lord Castlestuart was created Earl of Castlestuart.

Lords Methven.—Henry Stewart, second son of Andrew, second Lord Avandale, became, 1526, third husband of Princess Margaret of England, widow of James

IV., and divorced wife of Archibald, Earl of Angus. In 1528 he was created Lord Methven.

LORDS DOUNE, EARLS OF MORAY, LORDS ST. COLME.—Sir James Stewart of Beath, third son of Andrew, second Lord Avandale, obtained from James V. the hereditary command of the castle of Doune, with the stewartry of Menteith. His son James was created Lord Doune 1581. His son, second Lord Doune, married Elizabeth, only child of James Stuart, Earl of Moray, Regent of Scotland, natural son of James V. (see MURRAY, JAMES, Earl of); and thereupon became Earl of Moray.

EARLS AND MARQUISES OF BUTE, LORDS WHARNCLIFFE, LORDS STUART DE ROTHESAY.—Sir John Stuart, natural son of Robert II., was made hereditary sheriff of Bute and Arran; and his descendant and representative, Sir James Stuart, had a baronetcy conferred on him 1627. Sir James Stuart, grandson of the baronet Sir James, was raised to the peerage as Earl of Bute. The fourth earl was advanced to the marquisate of Bute. The present peer is the third marquis. Two grandsons of the third earl were raised to the peerage as Lord Wharncliffe.

EARLS OF ANGUS.—Sir John Stewart (commonly called of Bonkyl), brother of James, fifth steward of Scotland, was progenitor of some of the most prominent branches of the family, and direct ancestor in the male line of James VI. and the Stuart kings who followed him. His eldest son was father of Sir John Stewart, created Earl of Angus 1329.

EARLS OF DARNLEY, EARLS AND DUKES OF LENNOX, LORDS OF AUBIGNÉ.—Sir Alan Stewart of Dreghorn, second son of Sir John of Bonkyl (see above), who with his brothers, John and James, fell at Halidon Hill 1333, was ancestor of this distinguished line. His eldest son, Sir John Stewart of Darnley, distinguished himself in the French wars, and was constable of the Scots army in France; for which the lordship of Aubigné of France was conferred on him, as well as the county of Evreux. His marriage with Elizabeth, one of the daughters and co-heirs of Duncan, Earl of Lennox, afterward added the Lennox estates to the family possessions. His grandson, Bernard Stuart, third Lord of Aubigné, distinguished alike for soldiership and statesmanship, held, among other dignities, those of Viceroy of Naples, Constable of Sicily and Jerusalem, and Duke of Terra Nova. His grandson, Sir John Stuart, was made Lord Darnley and claimed the earldom of Lennox. His grandson, John, third Earl of Lennox, was taken prisoner at Linlithgow, and murdered by Sir James Hamilton of Finnart, Arran's natural son. His son, Matthew, fourth Earl of Lennox—by the termination of the male line of Robert III. at the death of James V., with the imperfect legitimacy of the descendants of the house of Albany—was placed in the position of heir-male of the stewards of Scotland. He married Lady Margaret Douglas, only child of Archibald, Earl of Angus, by the

queen-dowager Margaret, sister of Henry VIII.; an alliance which brought his children into the position of being nearest heirs after Mary, Queen of Scots, to the crown of England. The issue were two sons, the elder of them the unhappy husband of the unhappy Queen Mary, and father of James VI. After Queen Mary's forced resignation, Lennox was appointed to the regency; and on his way to hold a parliament at Stirling 1571, he was attacked by a party of the queen's friends, and mortally wounded.

The earldom and estates of Lennox, which, on the death of the fourth earl, had devolved on James VI. by right of blood, were conveyed by him to his uncle, Charles fifth Earl of Lennox, brother of Lord Darnley. The marriage of this earl 1574, with a sister of the first Earl of Devonshire, gave great displeasure to Elizabeth, whose own doubtful legitimacy made her very sensitive to possible pretensions to the throne. The sole issue of that union was a daughter, Arabella, and the earldom went in succession to the fifth earl's uncle, Robert, Bp. of Caithness, and to his cousin, Esme, son of John Stewart, Lord of Aubigné, youngest son of the third Earl of Lennox, who was created Duke of Lennox. The near relationship to the crown, both of England and Scotland, in which the fifth earl's daughter, the unfortunate Lady Arabella Stewart, stood, made her an object of jealousy equally to James and Elizabeth. Elizabeth first interfered to prevent her contemplated marriage with her cousin, Esme, Duke of Lennox, and afterward imprisoned her for listening to overtures from a son of the Earl of Northumberland. The result was, that this lady formed an illicit connection with William Seymour, afterward Marquis of Hertford; on discovery of which, both were summoned by James before the privy council, and severely reprimanded. The consequence was the reverse of what was intended. Lady Arabella privately married Seymour; which becoming known, she and her husband were committed into custody. Both effected their escape: Lady Arabella was overtaken in Calais Roads, and imprisoned in the Tower, where these undeserved oppressions drove her into lunacy, in which she died 1615.

Lord Pittenweem.—A descendant of Alexander Stewart of Galston, younger brother of the first Lord Darnley, was made Lord Pittenweem.

Stuarts of Castlemilk.—The earliest proved ancestor of this branch was Sir William Stewart of Castlemilk, 1398. Archibald Stuart of Castlemilk was created a baronet of Nova Scotia by Charles II.

Steuarts of Allanton, Coltness, etc.—This family, which came into notice in the 16th c., is of unascertained descent. Sir James Steuart of Coltness and Kirkfield, younger brother of Sir Walter of Allanton, and his son, Sir Thomas, were active Covenanters; and the latter, the framer of the act of 1690 for regulation of the Church of Scotland, was made a baronet 1698. Sir Rob-

ert Steuart, fourth baronet, filled the natural-philosophy chair in the Univ. of Edinburgh, in the beginning of the 18th c., in which chair his son succeeded.

EARLS OF GALLOWAY.—Sir Walter Stewart of Dalswinton, third son of Sir John of Bonkyl, obtained the lands of Dalswinton from King Robert Bruce, and Garlies from his nephew, John Randolph, Earl of Moray. His great-granddaughter, Marion, married Sir John Stewart, son of Sir William Stewart of Jedworth; and Sir Alexander Stewart of Garlies, eighth in descent from Sir John and Marion Stewart, was created Lord Garlies 1607, and Earl of Galloway 1623. In 1796, John, seventh Earl of Galloway, was created a British peer as Baron Stewart of Garlies.

LORD BLANTYRE.—This branch of the house of S. is descended from Sir Thomas Stewart of Minto, one of whose descendants, 1606, was raised to the peerage as Lord Blantyre.

VISCOUNTS MOUNTJOY, EARL OF BLESSINGTON.—Sir William Stewart, descended from Walter Stewart of Tonderghie, was made a baronet of Ireland 1623. His grandson, Sir William Stewart, second baronet, was 1682 created Baron Stewart of Ramalton, and Viscount Mountjoy in the peerage of Ireland. The second viscount, his son, married the daughter and eventually heiress of Viscount Blessington; and their son, third Viscount Mountjoy, was advanced to the earldom of Blessington.

EARLS OF ATHOLE, LORDS OF LORN AND INNERMEATH. —Sir James Stewart, fifth son of Sir John of Bonkyl, killed with his brothers Alexander and John at Halidon Hill, had two grandsons, John and Robert, who married the two co-heiresses of the princely house of De Ergadia, Lord of Lorn, who were also co-heirs of the line of Robert Bruce. The younger son, Robert of Durrisdeer, was ancestor of a line of Stewarts of Rossyth and Craigiehall, to which line Oliver Cromwell's mother was said by some authorities to have belonged: but this relationship has been disproved in recent years. The elder son, Sir John, whose wife was the elder and principal coheiress, had five sons: the eldest, Robert, became Lord of Lorne; the third, Sir James, known as the Black Knight of Lorn, was husband of James I.'s widow; and his eldest son, brother uterine of James II., was created Earl of Athole. His great-grandson, John Stewart, fourth Earl of Athole, was much involved in the political events of Mary's and James VI.'s time. An adherent of the old faith, and at first a stanch supporter of the queen, he nevertheless assisted in her seizure, and was a leader in the association 1567 for the defense of James VI. In 1577, he became chancellor of Scotland, and died suddenly under suspicion of poison from Morton. His son, fifth Earl of Athole, had no male issue; and at his death, the earldom fell to the crown, and was conferred on the elder branch of the House of Innermeath.

Robert, Lord of Lorn, eldest brother of the Black Knight, had two sons. The elder of these, John, second

Lord of Lorn, had three daughters, through one of whom, who married the Earl of Argyll, the lordship of Lorn passed to the Argyll family. The second son of Robert, Lord of Lorn, was Walter, Lord Innermeath, whose descendant and representative, John, sixth Lord Innermeath, obtained the earldom of Athole on the death of the above-mentioned fifth earl. The earldom of Athole was then conferred by Charles I. on the Earl of Tullibardine, grandson through his mother of the fifth Earl of Athole, from whom the existing ducal House of Athole is descended.

EARLS OF BUCHAN.—The earldom of Buchan was 1469 bestowed on James Stewart, second son of the Black Knight of Lorn. His legitimate line ended in the fourth generation in an heiress, Christian, Countess of Buchan, who, marrying a son of Sir Robert Douglas of Lochleven, carried the earldom of Buchan into his family.

EARLS OF TRAQUAIR.—James Stewart, first Earl of Buchan, had, besides his lawful issue, a natural son, James, legitimated 1489, on whom his father conferred the lands of Traquair. His descendant, Sir John Stuart, was created by Charles I. Lord Stuart of Traquair 1628, and 1633 Earl of Traquair. The title became extinct or dormant on the death of the eighth earl 1861.

Many works have been written to elucidate the history of the S. family, or particular branches of it, including Symson's *General and Historical Account of the Stewarts* (Edin. 1712); Duncan Stewart's *Historical and Genealogical Account of the Royal Family of Scotland, and of the Surname of Stewart* (Edin. 1739); Noble's *Historical Genealogy of the Royal House of Stewart* (Lond. 1795); and Andrew Stuart of Castlemilk's *Genealogical History of the Stewarts* (Lond. 1798), a work full of laborious research, but nearly confined to the Houses of Darnley, Lennox, and Castlemilk; Chalmers's *Caledonia* (1807–24).

STUB, n. *stŭb* [Dut. *stobbe;* Low Ger. *stubbe*, a stump: Dan. *stub*, a stump, stubble: Gael. *stob*, a stake or stump]: the stump of a tree; something short and thick, like a *stub:* V. to grub up by the roots; to extirpate. STUB'BING, imp. STUBBED, pp. *stŭbd:* ADJ. short and thick; blunt: in *OE.*, hardy. STUBBY, a. *stŭb'bĭ*, abounding in stubs; short and thick. STUB'BINESS, n. *-nĕs*, the state of being stubby. STUB-END, in *mech.*, the enlarged end of a connecting-rod to which the strap is fastened. STUB-NAIL, a nail broken off; a short thick nail.

STUBBLE, n. *stŭb'bl* [OF. *estouble;* Ger. and Dut. *stoppel*, the stubs of corn—from STUB, which see]: the stumps or root-ends of corn left in the ground after the corn has been cut down. STUBBLED, a. *stŭb'bld*, covered with stubble. STUBBLE-FED, a. fed among the fine natural grass which grows among stubble, as cows or geese.

STUBBORN, a. *stŭb'bŏrn* [from STUB, which see]: unbending, like a stub; rigid; obstinate; inflexibly headstrong. STUB'BORNLY, ad. *-lĭ*, inflexibly; obstinately. STUB'BORNNESS, n. *-nĕs*, obstinacy; stiffness; want of pliancy.—SYN. of 'stubborn': inflexible; obdurate; stiff; hardy; firm; refractory; intractable; heady; contumacious; rugged; persistent; persevering; steady; harsh; rough.

STUBBY: see under STUB.

STUCCO, n. *stŭk'kō* [It. *stucco*, a kind of fine plaster—from OHG. *stucchi*, a crust]: composition used for the finer internal plaster-work, cornices, enrichments, etc.—made of lime and pounded Gypsum (q.v.) or pulverized marble; white powder of calcined gypsum mixed with thin glue, used extensively for making figures, ornaments, and casts: a coarser S. is used for making floors, and for plastering the exterior of buildings: V. to cover or overlay with stucco. STUC'COING, imp. STUC'COED, pp. *-kōd:* ADJ. plastered with stucco. STUC'COER, n. *-ĕr*, one who stuccoes.

STUCK, v. *stŭk:* pt. of STICK, which see. STUCK, n. in *OE.*, a thrust. STUCK-UP, a. stiffly and affectedly vain; exclusive; self-important and puffed up; an Australian expression signifying 'robbed on the highway.'

STUD, n. *stŭd* [Icel. *stod;* Sw. *stöd*, a post: Dan. *stöd*, a stump]: a knob or projecting head of a nail or button; an ornamental knob; a double-headed ornamental button removable at will; a supporting beam inserted in a sill; a stay; a prop: V. to adorn with studs or knobs; to set with projecting or prominent ornaments. STUD'DING, imp.: N. material for studs or joists; joists, considered collectively. STUD'DED, pp. STUD'DING-SAILS, narrow sails set at the outer edges of the square-sails when the wind is light.

STUD, n. *stŭd* [Ger. *gestüt;* Dan. *stod*, a stud: Ger. *stute*, a mare: Pol. *studo*, a collection of breeding-horses]: a collection of breeding-horses and mares. STUD-HORSE, a breeding-horse; a stallion.

STUDENT, STUDIED, STUDIOUS: see under STUDY.

STUDIO, n *stū'dĭ-ō* [It. *studio*, study, a school (see STUDY)]: an artist's study or workshop.

STUDY, n. *stŭd'ĭ* [L. *studĭum*, application to a thing—from L. *studĕō*, I am eager, I apply myself: It. *studio;* F. *étude*, study]: the application of the mind or thoughts to a subject for the purpose of learning what was not before known; deep attention; any particular branch of learning on which the mind may be set in order to its acquirement; subject of attention; a place allotted to study; in the *fine arts*, a work undertaken for improvement; the sketched ideas of a painter. V. to fix the mind closely upon a subject in order to understand it; to learn by application; to dwell upon in thought; to muse; to apply the mind to; to consider attentively. STUD'YING, imp. *-ĭ-ĭng*. STUD'IED, pp. *-ĭd*, closely examined; well considered: ADJ. learned; premeditated; thought out. STUDENT, n. *stū'dĕnt* [L. *studens* or *studen'tem*, studying]: one engaged in study; one

preparing for a liberal profession by attending a university or great school; a scholar or learner. STU'DENTSHIP, n. state or time of being a student. STU'DENTRY, n. *-dĕnt-rĭ*, a body of students. STU'DIOUS, a. *-dĭ-ŭs*, devoted to the acquisition of knowledge from books; thoughtful; eager to discover something, or to effect some object; diligent; busy. STU'DIOUSLY, ad. *-lĭ*. STU'DIOUSNESS, *-nĕs*, the quality of being studious.

STUFA, n. *stō'fă* [It. *stufa*, a stove, a hothouse]: a fissure or orifice in a volcanic district from which jets of steam issue, often at a temperature much above that of boiling water.

STUFF, n. *stŭf* [Ger. *stopfen*, to fill up a cavity, to stop: F. *estouffer*, to stifle, to smother: Ger. *stoff*, stuff, matter, substance: It. *stoffa*, stuff, material: mid. L. *stuppāre*, to cram—from L. *stuppa*, tow (see also STOP)]; any collection of substances; any mixture or medicine; materials of which anything is made; the woven fabric of which clothes are made; something trifling or worthless; trash; that which fills anything; in *OE.*, elemental part; essence: V. to fill very full; to crowd; to press; to cause to swell out by putting something in; to thrust into; to fill meat with seasoning; to fill, as the skin of a dead animal for preserving its likeness; to feed gluttonously; to obstruct, as one of the organs; to obstruct the organs of scent or respiration, as by a cold. STUF'FING, imp.: N. that which is used for filling anything; in *cookery*, force-meat used for filling the bodies of small animals, e.g., poultry, or for filling openings made for the purpose in large joints. It usually consists of bread-crumbs, savory herbs and other seasonings, minced very fine. STUFFED, pp. *stŭft*. STUFFER, n. *stŭf'fĕr*, one who stuffs. STUFFY, a. *stŭf'fĭ*, close; confined, as a room; in *Scot.*, stout; brave. HOUSEHOLD STUFF, the goods with which a house is filled to fit it for occupation. STUFFING-BOX, the packed arrangement of a quantity of hemp or India-rubber at the end of a piston-rod working in a cylinder, or where it passes through the cylinder cover, by which the part is rendered close-fitting and tight.

STUHLWEISSENBURG, *stōl-vī'sĕn-bûrch* (Hung. *Székes Fejérvár*, Slav. *Bielihrad* or *Bialigrad*, L. *Alba Regalis* or *Alba Regia*): royal free town of Hungary, seat of a bishop, formerly cap. of the kingdom; in a swampy but fertile plain near the marshes of Sár-Rét; 16 m. n.e. of Lake Balaton. The principal buildings are the splendid Cathedral of the Virgin Mary, the Church of St. John, and the bishop's palace. It has several Rom. Cath. schools, a milit. acad., and a theatre. The manufactures are cotton cloths, flannels, leather, silk, and knives ('Stuhlweissenburg clasp-knives'); and soda is extracted from the swamps, which are, moreover, rich in fish, crabs, tortoises, and water-fowl. The horse-fairs are famous. S. is on the site of the Roman *Floriana*, and 1027 to 1527 was the place where the kings of Hungary were crowned and buried, 14 of whom repose here. In later times it was for some years in the hands of the Turks. Pop. (1890) 27,548.

STULTIFY, v. *stŭl'tĭ-fī* [L. *stultus*, foolish; *facĭō*, I make]: to cause to appear foolish, unmeaning, or contradictory; to prove to be void of understanding. STUL'TIFYING, imp. STUL'TIFIED, pp. *-fīd*. STUL'TIFICA'TION, n. *-fĭ-kā'shŭn*, the act of making foolish; the state of being stultified.

STUM, n. *stŭm* [Dut. *stom*, dumb, wine that has not worked from being over-sulphured: Ger. *stumm;* Dan. and Sw. *stum*, dumb]: in *OE.*, unfermented wine; must; wine revived by fermenting anew: V. to renew or doctor with stum. STUM'MING, imp. STUMMED, pp. *stŭmd*.

STUMBLE, v. *stŭm'bl* [prov. Sw. *stambla, stomla*, to stumble: Norw. *stumpa*, to stumble, to totter: prov. Dan. *stumle*, to strike the ground with the feet]: to make a false step; to trip in walking; to strike the foot against an obstacle in walking; to slide into crime or error; to light on by chance: N. a trip in walking or running; a blunder; a failure. STUM'BLING, imp.: N. act of one who stumbles. STUMBLED, pp. *stŭm'bld*. STUM'BLER, n. *-blĕr*, one who stumbles. STUM'BLINGLY, ad. *-blĭng-lĭ*. STUMBLING-BLOCK, that which causes a person to stumble or fall into error; an obstruction.

STUMP, n. *stŭmp* [Dut. *stomp;* Icel. *stumpr;* Sw. and Dan. *stump;* Ger. *stumpf*, a stump: Dut. *stompen;* Bav. *stumpen*, to push, to thrust]: the end remaining after something has been cut or worn off; the remaining part of the trunk of a tree after being cut down; an artist's soft pencil or rubber; in *cricket*, one of a set of three rods or posts of wood which support the bails and constitute the wicket: V. to lop; to curtail; to walk about heavily and clumsily; to deliver electioneering speeches; in *cricket*, to knock down a stump so as to put a batsman out of play. STUMP'ING, imp. STUMPED, pp. *stŭmpt*, in *slang*, ruined; deceived. STUMPY, a. *stŭmp'ĭ*, resembling a stump; stout and thick. STUMP-ORATOR, a man who harangues the multitude on a passing topic, generally political. To STUMP OUT, in *cricket*, to knock down the stump or wicket before the batsman has reached it; to put down; to outwit. To STUMP UP, in *slang*, pay your reckoning or share; pay ready money down.

STUN, v. *stŭn* [AS. *stunian*, to resound, to dash: Ger. *staunen*, to be amazed]: to stupefy with noise or with a blow; to make senseless. STUN'NING, imp.: ADJ. confounding with noise; astonishing. STUNNED, pp. *stŭnd*. STUN'NER, n. *-nĕr*, one who or that which stuns; in *slang*, something splendid; a fine fellow.

STUNDISTS, *stŭn'dĭsts:* Russian sect of dissenters, said to have been formed in Kherson 1817 by colonists from Würtemberg, but not known as a sect until about 1860. Their number has been stated as a million, but this is improbable. They were most numerous (1871) in the province of Kherson, s. Russia, where there were 800; and at Tarachtschd, near Kiev, there were 450. Their name is from the German *stunden*, hours or lessons, referring to their meetings for reading the Bible, which volume they believe

every one is free to interpret in his own way. They recognize no sacraments except baptism and the Lord's Supper, both observed with simplicity. The cult of saints, images, and observance of Lent, etc., they reject. While submitting to civil laws, they disown the authority of Hierarchies. In character and habits they are pure, honest, sober, and industrious.

STUNG, v. *stŭng:* pt. and pp. of STING, which see.

STUNK, v. *stŭngk:* pt. and pp. of STINK, which see.

STUNT, v. *stŭnt* [Icel. *stuttr*, short: old Sw. *stunt*, docked, short; *stunta*, to shorten: Ger. *stutz*, anything cropped; *stutzen*, to shorten (see also STINT)]: to hinder from growth or increase. STUNT'ING, imp. STUNT'ED, pp.: ADJ. hindered in growth; dwarfed. STUNT'EDNESS, n. *-nĕs*, the state of being stunted.

STÛ'PA: Buddhist monument: see TOPE.

STUPE, n. *stūp* [L. *stūpa;* Gr. *stūpē*, tow]: cloth or flax dipped in warm medicaments and applied to a sore or wound; a fomentation: V. to dress with stupes; to foment. STU'PING, imp. STUPED, pp. *stūpt.* STUPA, n. *stū'pā*, in *bot.*, a tuft or mass of hair or fine filament matted together. STUPOSE, a. *stū-pōs'*, having a tuft of hairs; composed of matted filaments.

STUPEFY, v. *stū'pĕ fī*, written also, but less properly, STU'PIFY [F. *stupéfier*—from L. *stupēfacĕrĕ*, to make stupid—from *stupĕō*, I am stupefied; *facĭō*, I make]: to make stupid; to deprive of sensibility; to blunt or deaden, as the faculty of perception. STU'PEFYING, imp. STU'PEFIED, pp. *-fīd.* STU'PEFIER, n. *-fī-ĕr*, one who or that which stupefies. STU'PEFAC'TION, n. *-făk'shŭn* [F. *stupéfaction*]: a stupid or senseless state; act of rendering stupid; torpor; stupidity. STU'PEFAC'TIVE, a. *-tĭv*, tending to cause insensibility; narcotic.

STUPENDIOUS, a. *stū-pĕn'dĭ-ŭs:* OE. for STUPENDOUS.

STUPENDOUS, a. *stū-pĕn'dŭs* [L. *stupen'dus*, stunning, astonishing—from *stupĕō*, I am stunned or stupefied]: overcoming the senses by its vastness; amazing; wonderful; of astonishing magnitude. STUPEN'DOUSLY, ad. *-lĭ.* STUPEN'DOUSNESS, n. *-nĕs*, the quality or state of being stupendous.

STUPID, a. *stū'pĭd* [F. *stupide*—from L. *stupĭdus*, amazed—from *stupĕō*, I am stupefied]: deficient in understanding; dull; senseless; sluggish of apprehension; done without the proper exercise of reason or judgment; foolish. STUPIDITY, n. *stū-pĭd'ĭ-tĭ*, or STU'PIDNESS, n. *-nĕs*, extreme dulness of understanding; sluggishness. STU'PIDLY, ad. *-lĭ.*—SYN. of 'stupid': simple; insensible; sluggish; doltish; sottish; dull; heavy.

STUPIFY: the less proper spelling of STUPEFY (q.v.).

STUPOR, n. *stū'pŏr* [L. *stupor*, stupor]: a state of body in which sense is either wholly or partially suspended; torpor; insensibility; extreme amazement or astonishment; moral stupidity.

STUPOSE: see under STUPE.

STUPRATE, v. *stū'prāt* [L. *stuprātus*, ravished; *stuprāre*, to ravish—from *stuprum*, adultery]: to debauch; to ravish. STUPRA'TING, imp. STUPRA'TED, pp. STUPRA'TION, n. *-prā'shŭn*, rape.

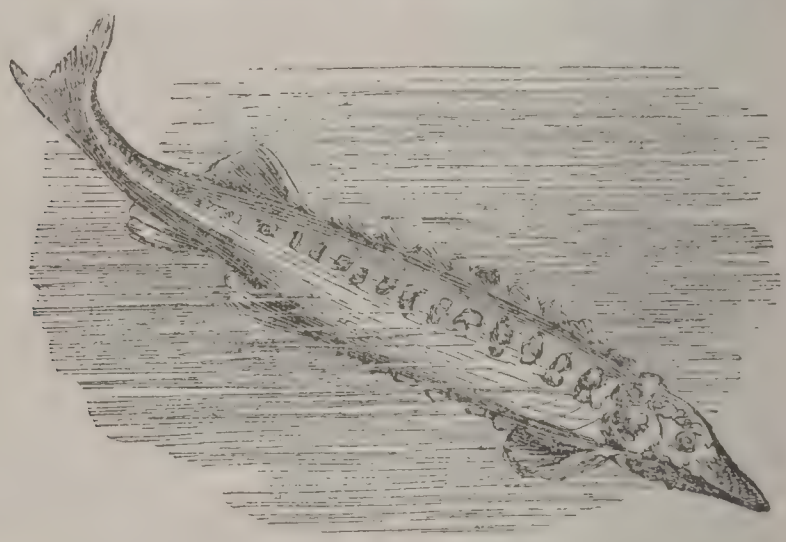
STURDY, a. *stĕr'di* [Bret. *stard*, firm, solid: Icel. *stirdr*, stiff, unbending]: stout; strong; hardy; bluntly obstinate; laid on with strength, as strokes. STUR'DILY, ad. *-di-lĭ*. STUR'DINESS, n. *-nĕs*, stoutness; hardiness.

STURDY, n. *stĕr'di*, or THE GID [Gael. *stuird*, vertigo, a disease in sheep: It. *stordire*, to make dizzy or giddy in the head: W. *twrdd*, noise, stir]: disease in sheep, and sometimes in cattle, caused by a parasite in the brain. The parasite is a hydatid, reaching sometimes the size of a hazel-nut, and floating in a watery fluid inclosed in a membranous sac. The diseased condition in sheep is known also as Giddiness and Staggers. The parasite producing it, formerly termed *Cœnurus cerebralis*, is now known to be the larva of *Tænia cœnurus*, the tapeworm of the dog. In the state of ova, the hydatid embryo is taken up with the grass, passes into the blood, and is thence laid down in the soft loose textures of the brain. It is most frequent in low damp pastures, and among sheep 6 to 20 months old. The animal cannot properly seek its food, loses condition, staggers when moved, turns stupidly round almost in one spot, and usually toward the side on which the hydatid lies. The parasite and its sac may generally be safely removed by placing the sheep, with its feet tied, on a table or bench, searching for the softened portion of the skull, which generally overlies the hydatid, laying back a flap of skin, and introducing the trochar and canula, and, when the sac is deep-seated, cautiously withdrawing it with the help of a small syringe. Protected by a leather cap and simple water-dressings, the wound speedily heals.

STURGE, *stĕrj*, JOSEPH: author and philanthropist: 1793, Aug. 2—1859, May 1; b. Elverton, Gloucestershire, England. He was a member of the Soc. of Friends; was one of the first to advocate the abolition of slavery, and soon became prominent among anti-slavery leaders. To observe the practical workings of slavery, he visited the W. Indies, and later the United States. In 1838 he published *The West Indies in* 1837; and in 1842, *Visit to the United States in* 1841. He acquired large wealth as a corn-factor in Birmingham, where he died.

STURGEON, n. *stĕr'jŭn* [F. *esturgeon;* Sp. *esturion;* It. *storione*, a sturgeon: OHG. *sturjo;* mid. L. *sturĭō;* Ger. *stör;* AS. *styrio*, a sturgeon], (*Accipenser*): Linnæan genus of cartilaginous fishes, now forming the family *Sturionidæ*, and placed by Müller in the order of *Ganoids*, distinguished by the Ganoid (q.v.) scales or bony shields which form the external covering. The gills are free, as in osseous fishes. The vertebral column is soft; and there are no evident sutures in the skull. Reproduction is by roe, as in osseous fishes. The form is elongated and angular; the plates are

in regular rows; the head is cuirassed; snout long and conical; mouth is on the under surface of the head, tubular, protractile, and without teeth. The upper lobe of the tail is much larger than the under. The dorsal and anal fins are opposite to one another, behind the ventrals. The air-bladder is very large, and communicates with the gullet by a large hole. The species are numerous, and inhabit both the sea and fresh water, ascending deep muddy rivers at certain seasons, and temporarily inhabiting lakes. Numerous species are found in northern parts of the world, though there are none in the Arctic Ocean, or the rivers which flow into it; but the south of Siberia and N. America abound in them. They are plentiful in the Caspian and Black seas, and in the rivers connected with them, where the S. fishery is of great importance, supplying the inhabitants of large districts with their chief subsistence, and producing great quantities of Caviare (q.v.), or preserved S. roe, and of isinglass (see GELATIN), for sale. About 20 species are known.—The Common S. (*A. sturio*) of Europe is a large



Sturgeon (*Accipenser sturio*).

fish, six or eight ft. in length, with five rows of flattened plates; muzzle long and pointed. Another species (*A. latirostris*) has broader muzzle. The S. was in very high repute for the table among the Greeks and Romans, at whose banquets it was introduced with particular ceremonies. In England, when caught in the Thames above London Bridge, it is a *royal* fish, and can be claimed by the sovereign. Its flesh is white, delicate, and firm. It is used both fresh (generally stewed) and pickled or salted.—The largest species is the Bielaga, or Huso (*A. huso*), of the Black and Caspian seas and their rivers. It attains 20 or 25 ft. length, and has been known to weigh nearly 3,000 lbs. Great part of the caviare of commerce is made from it, and much isinglass, which is merely the air-bladder washed, cut into strips, and dried. The Sterlet (*A. ruthenus*) is only about three ft. in length, found in the same regions. There are several other European and Asiatic species.

On our Atlantic coast, the most common species, the Sharp-nosed S. (*A. oxyrhynchus*) is now regarded as identical

with *A. sturio* of Europe. Another marine species, not yet found n. of Cape Cod, is the Short-nosed S. (*A. brevirostris*); the beak is much shorter and blunter, the head high and regularly convex; the dorsal plates begin as far back as the pectoral fins, and their apexes do not present a sharply serrate profile. Both species ascend large rivers in summer, and have been utilized by curing in smoke, and the manufacture of caviare from the eggs; the flesh is red, and has been called 'Albany beef.'—The Lake S. (*A. rubicundus*), of the Great Lakes and Miss. valley rivers, averages 5 ft. in length, the fins reddish, and has the general outline of the Common S., with the lateral plates larger and semi-lunar, instead of irregularly rhombic. The French Canadians prepare a *bouillon* from the fresh meat, skimming off the oil, and it is much like chicken-soup. At Sandusky, O., the S. is smoked in large quantities, the spawn made into caviare, the bladders into isinglass, and the rest boiled for oil.—The White S. (*A. transmontanus*) is the common one of the Pacific coast and its large rivers, attaining 8–10 ft. length, abundant in the San Francisco market, and utilized like the eastern species.—A rarer species of the same range is the Green S. (*A. medirostris*), reputed poisonous as food, but whether justly has not been made certain.—The Shovel-nosed S. (*Scaphirhynchops platyrhynchus*) of the large rivers of the west and south, differs remarkably from the preceding, as its name indicates; also in the slender elongation of the body between the dorsal and caudal fins, and the long whip-like elongation of the upper lobe of the latter. It is much used for food on the Ohio, but not much valued.—The food of sturgeons is mostly shell-fish; the flesh has little of the taste of fish, and by proper modes of cooking is palatable.

STURGES, *stĕr'jĕs*, JONATHAN: merchant: 1802, Mar. 24—1874, Nov. 28; b. Southport, Conn. In 1821 he went to New York, and engaged as clerk in a mercantile house; 1828 became its junior, and 1836 its senior partner; retiring 1868. He was one of the founders of the Union League Club, and at one time vice-pres. of the New York chamber of commerce; was an earnest advocate of municipal reform, and strongly opposed the Tweed ring; a liberal patron of art; and gave freely to worthy charities. He died in New York.

STURGIS, *stĕr'jĭs*, SAMUEL DAVIS: soldier: 1822, June 11—1889, Sep. 28; b. Shippensburg, Penn. He graduated at West Point 1846, and was assigned to the 2d dragoons; served through the Mexican war, and afterward on the frontiers. At the beginning of the civil war, S. was in command of Ft. Smith, Ark.; and, to prevent the capture of soldiers and govt. property, he evacuated it without waiting for orders, and took his command to Ft. Leavenworth, Kan. 1861, May 3, he was commissioned maj. of the 4th cav., and served under Gen. Lyon, succeeding that officer at his death at the battle of Wilson's Creek, Aug. 10. He was made brig.gen. of vols. from that date, and assigned to the army of Tenn., subsequently to the dept. of Kansas. In 1862 he was transferred to the eastern dept.;

was engaged at Antietam, South Mountain, and Fredericksburg. 1865, Mar. 13, he was brevetted brig.gen. and maj.gen. U. S. army. He died at St. Paul, Minn.

STURIONIAN, a. *stū'rĭ-ō'nĭ-ăn:* pertaining to the sturgeon family of fishes.

STURTEVANT, *stĕr'tē-vant,* JULIAN MONSON, D.D., LL.D.: 1805, July 26—1886, Feb. 11; b. Warren, Conn.: educator and author. Graduated at Yale 1826, and its Divinity School 1829, he was thereafter connected with Illinois Coll., at Jacksonville, Ill., as tutor 1829–30; prof. of math., natural philos., and astron. 1831–34; pres. and prof. of mental and moral philos. 1844–76; and prof. of mental science and science of govt. until his death. His service in all departments was of a high order. Besides many occasional papers, he published *Economics, or the Science of Wealth* (1878), a unique work that aims to define rigidly, and to develop logically, the whole subject from the principle of individual ownership. He also was author of *Keys of Sect, or the Churches of the N. Test.* (1879). As writer and educator he was distinguished for spiritual fervor and for broad and progressive thought.

STUTTER, v. *stŭt'tĕr* [Low Ger. *stötern;* Ger. *stottern,* to stutter: Swiss, *dudern,* to stammer: Icel. *stauta,* to read stutteringly]: to speak imperfectly with broken efforts of the voice; to hesitate in uttering words; to stammer (see STAMMER): N. hesitation in speaking; the broken efforts of the voice in imperfect speech. STUT'TERING, imp.: ADJ. hesitating; stammering: N. act of stammering. STUT'TERED, pp. *-tĕrd.* STUT'TERER, n. *-tĕr-ĕr,* one who hesitates or stammers in uttering words. STUT'TERINGLY, ad. *-lĭ.*

STUTTGART, *stŭt'gärt:* city, the royal residence and metropolis of Würtemberg; beautifully situated about 115 m. w.-by-n. from Munich; 897 ft. above sea-level, in a widening of the Nesenbach valley just above the river Neckar—the hills forming a semicircle clothed with vineyards, orchards, and gardens. The climate is mild and healthful. Except in the very oldest part of the city, the streets are broad, and the buildings handsome. The Schloss, or palace, is a fine modern structure. Indeed, the recent Renaissance style has perhaps its best illustration in S. The royal park and gardens (560 acres) extend from the n.e. side of the palace more than two m., almost to Cannstadt, adorned by fine groups of trees, and intersected by shady avenues, in which all classes may freely walk. The cathedral, built in the 15th c., was gifted by the king, 1852, with several beautiful painted windows. Other principal buildings are the royal theatre, public library, mint, museum of art, polytechnic school, post-office, the new synagogue, several new churches and schools, and the palace of justice; also the Königsbau, with its ball and concert rooms, shops, etc., and its superb colonnade. The new railway station is one of the finest in Europe. The royal library contains about 400,000 vols., 4,000 MSS., 9,000 Bibles in 80 languages, and

2,400 specimens of early printing. The art collections of S. are extensive and valuable. Its educational institutions are excellent, and it is the centre of the publishing business in s. Germany. S. has many benevolent institutions and societies. There is direct railway communication with the leading cities of Germany and Switzerland. Since 1866, especially since the Franco-German war, trade has increased remarkably. The principal industries are: manufacture of cotton and half-wool fabrics, iron and tin work, gold and silver articles, pianos, sugar, chocolate, chemicals, tobacco, beer, etc. The value of the declared export of manufactures to the United States for the first quarter in 1891 was $315,140. Cannstadt (q.v.) though not officially is yet practically a part of S.: its beautiful situation and mineral springs attract many visitors.—S. was the birthplace of Hegel; here, also, Schiller's youth was spent.—The name of the city occurs for the first time 1229. It was besieged by King Rudolph of Hapsburg, 1286–7, and appears then to have been a place of strength. 1634–38 nearly 9,000 people died of the plague; and during the wars of Louis XIV., S. was thrice taken, and again 1796, 1800, and 1801.—Pop. (1800) less than 20,000; (1871) 91,623; (1880) 117,303—about four-fifths Protestants; (1890) 138,659; (1900) 176,699.

STUYVESANT, *stī've·sant*, PETER: last of the Dutch governors of New Amsterdam: 1602–1682, Aug.; b. in Holland. After military service in the W. Indies, he governed the colony of Curaçoa, and lost a leg in an attack on the island of St. Martin. Having been appointed director-gen. of the New Netherlands (a country of indefinite extent, including the Hudson river, claimed by the Dutch W. India Company under the discovery by Hendrik Hudson), he came to New Amsterdam 1647, May, then in the 24th year of its colony settlement. He quieted the Indian hostilities which had occasioned complaint against his predecessor William Kieft; and at Hartford 1650, where the Dutch had a trading-post, he adjusted with the English colonies a vexed question of boundary, growing out of the discovery and exploration of the Conn. river by the Dutch. In 1655, with a force of less than 700 men, he subdued the Swedish Ft. Christiana (near the present Wilmington, Del.), the Swedes having, a year previously, taken the Dutch Ft. Casimir, 5 m. below, built to maintain the Dutch claim by right of first exploration and settlement. In the same year the peace of New Netherlands was disturbed by an Indian raid, and by a conspiracy in the English settlement of Gravesend; but Gov. S., though amenable to reason, was peremptory in emergencies. His administration was energetic, as shown by summary dispersal of a convention of the people, who demanded a more popular system of government. Threatening them with punishment on persistence, he declared that his authority was only from God and the W. India Company. With the New Englanders, who encroached on his domains, he had continued trouble, and vainly presented in person his grievances to a convention of the eastern colonies at

Boston. The question was unjustly settled by the grant from Charles II. to the Duke of York of all territory from the Connecticut river to Delaware Bay, and by the arrival of an English fleet 1664, to which Gov. Stuyvesant, forced by his burghers and by necessity, reluctantly surrendered. After reporting to the company in Holland, he returned and passed the rest of his life on his farm, from the name of which, Anglicized, the street which is the present Bowery takes its designation. The farm, of irregular shape, was approximately bounded by 23d st., 4th ave. (running through the centre of Union Square), Broadway to Houston st., thence sending an angle to Rivington st., thence to 5th st. on the East river, thence along the river to 23d st. again. The remains of Gov. S. are in the crypts of St. Mark's Church, 10th st. and 2d ave., New York.

STY, v. *stī* [AS. *stigan*, to climb, rise]: in *OE.*, to climb upward; to soar; to ascend. STY'ING, imp. STIED, pp. *stīd*.

STY, n. *stī*, STIES, n plu. *stīz* [Icel. *stí;* Dan. *sti;* Sw. *stia*, a sty]: an inclosure for swine; any place extremely filthy; in *OE.*, a place of bestial debauchery: V. to shut up in a sty. STY'ING, imp. STIED, pp. *stīd*.

STY, n., or STYE, n. *stī* [Norw. *sti*, *stigje;* Low Ger. *stieg*, a pustule at the corner of the eye]: popular name for Hordeolum, a minute inflammatory swelling, like a boil, on the edge of the eyelid. It begins as a small, red, tense swelling, accompanied with considerable itching and a feeling of stiffness. As the inflammation goes on, the lid may become so swollen as to keep the eye closed. In a few days, matter forms; a white point appears at the apex of the swelling; and when the cuticle gives way, pus and a small slough of connective tissue escape, after which there is a general remission of the symptoms, and the eyelid soon resumes its natural state.—This common affection is chiefly confined to scrofulous and delicate children, though occurring sometimes in persons of more advanced age. The best local treatment is application of warm-water dressings with lint and oiled silk; and if any hardness remains after discharge of the matter, dilute nitrate of mercury ointment may be applied. The sty should never be rubbed (notwithstanding the common prejudice in favor of rubbing it with a gold ring), nor, in general, is it necessary to puncture it. To prevent recurrence, attention should be given to the diet, which should be abundant and nourishing, to the state of the bowels, and to the general health; and tonics may usually be prescribed with advantage. The old form of the word was *stian*.—See Holland's *Plinie*, book XXVIII., chap. xi.

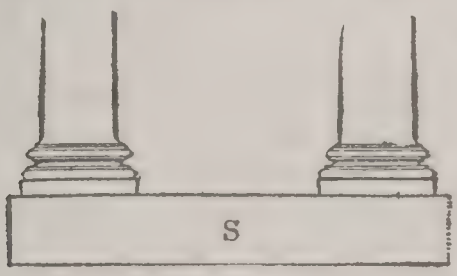
STYGIAN, a. *stĭj'ĭ-ăn* [L. *Styx;* Gr. *Stux*, a river in the infernal regions by which the gods swore]: pertaining to Styx; hellish; infernal: see STYX.

STYLAGALMAIC, a. *stī'lă-găl-mā'ĭk* [Gr. *stulos*, a pillar, a column; *agalma*, an image]: in *arch.*, applied to figures performing the office of columns.

STYLE, n. *stīl* [F. *style*, style—from L. *stylus*, a stake, a pale, a style for writing]: distinctive manner of writing in regard to the use of language and the choice of words; phraseology; manner of speaking; peculiar mode of expression and execution, as style of architecture, painting, music, etc.; formal address; title; appellation; particular mode in conducting proceedings, as in a court of justice; mode; manner; fashion; among the *ancients*, a pointed instr. of bronze or iron for writing on tablets covered with wax; the pin of a dial which projects the shadow; in *bot.*, the stalk interposed between the ovary and the stigma: V. to call; to name; to designate. STY'LING, imp. naming; denominating. STYLED, pp. *stīld*. STYLAR, a. *stī'lĕr*, pertaining to the gnomon of a dial. STY'LATE, a. *-lāt*, or STY'LIFORM, a. *-lĭ-fawrm* [L. *forma*, shape]: resembling a style or pen; pointed. STY'LET, n. *-lĕt*, a small-pointed poniard or dagger. STY'LISH, a. *-lĭsh*, showy; fashionable. STY'LISHLY, ad. *-lĭ*. STY'LITE, n. *-līt*, in *anc. times*, one of a class of religious enthusiasts who took up their abodes on the tops of columns or pillars (see PILLAR SAINTS). STYLE OF COURT, the practice observed by a court in its proceedings. NEW STYLE: see under NEW. OLD STYLE: see under OLD (also, see CALENDAR).—SYN. of 'style, v.': to denominate; call; term; characterize;—of 'style, n.': diction; manner; course; way; mode.

STYLO-, prefix, *stīl-ō* [Gr. *stulos*, a pillar, a post]: pillar-like; having processes or projections resembling small pillars; in *anat.*, of, belonging to, or attached to the styloid process of the temporal bone.

STYLOBATE, n. *stī'lō-bāt* [Gr. *stulos*, a pillar; *bătēs*, one that treads—from *bainō*, I walk]: in *arch.*, any basement or substructure (e.g., of a temple) upholding columns



S, Stylobate.

above the ground; sometimes continuous all round the peristyle in the form of three high steps: sometimes it resembles a continuous pedestal along each side, with flights of steps at either end.

STYLOGRAPHY, n. *stī-lŏg'rā-fĭ* [L. *stylus*, a stake, a style, and Gr. *graphō*, I write]: the art or mode of tracing lines with a pointed instr. on cards or tablets. STY'LOGRAPH'IC, a. *-lō-grăf'ĭk*, pertaining to. STY'LOGRAPH'ICALLY, ad. *-ĭ-kăl-lĭ*. STY'LOID, a. *-loyd* [Gr. *eidos*, resemblance]: having some resemblance to a style or pen; in *anat.*, applied to a process of the temporal bone.

STYLONURUS, n. *stī'lō-nū'rŭs* [Gr. *stulos*, a stake, a style; *oura*, the tail]: in *geol.*, a crustacean of the lower Old Red Sandstone, of the family *Eurypteridæ*.

STYLOPOD, n. *stī'lō-pŏd*, or STYLOPO'DIUM, n. *-dĭ-ŭm* [Gr. *stulos*, a stake, a post; *pous* or *podu*, a foot]: in *bot.*, a fleshy disk at the base of the styles of the Umbelliferæ.

STYPHNIC ACID, *stĭf'nĭk:* a substance produced by the action of nitric acid on asafetida.

STYPTIC, n. *stĭp'tĭk* [L. *styp'ticus;* Gr. *stup'tikos*, astringent—from Gr. *stuphō*, I contract: F. *styptique*]: in *med.*, a substance which checks local bleeding, by application to the bleeding orifice or surface (see BLEEDING): ADJ. astringent; having the property of restraining bleeding. STYPTICITY, n. *stĭp-tĭs'ĭ-tĭ*, the quality of being astringent.

STYRACINE, or STYRACIN, n. *stī'rā-sĭn* [L. *styrax;* Gr. *sturax*, storax]: a crystalline substance obtained from storax.

STYRIA, *stĭr'ĭ-â* (Ger. *Steiermark*): duchy, one of the crown-lands of Austria, in the Cis-Leithan part of the Austrian empire; bounded n. by Upper and Lower Austria, e. by Hungary and Croatia, s. and w. by Carniola, Carinthia, and Salzburg; 8,671 sq. m., and pop. (1880) 1,213,197, who are partly of German and partly of Slavic origin. S. is mountainous, traversed in the w. and centre by branches of the Noric Alps, which spread into numerous ramifications; while the s. portion, between the Drave and the Save is occupied by branches of the Carnic Alps. The climate, like that of most mountainous countries, is variable; but is generally raw and cold in the n. and more mountainous portion, and mild in the south. But in spite of its physical character, agriculture is so zealously prosecuted that seven-eighths of the country are under cultivation, producing rye, wheat, oats, and maize. Vines are largely cultivated in various parts, and orchards are numerous. The chief wealth of the country, however, is in its mineral products, which include immense quantities of iron, besides lead, copper, gold, silver, marble, limestone, and slate, with abundance of salt and coal. The chief industries are thus connected with production of iron and steel, and their manufacture into articles of such excellent quality as to be in great demand in other countries. There are manufactures also of brass and lead articles, earthenware, paper, tobacco, glass, white lead, copper-hammers, and of cotton, linen, cloth, etc.—S. was anciently divided between Noricum and Pannonia, and has generally followed the fortunes of the two provinces of Upper and Lower Austria. The Reformation was early and generally welcomed in S.; but the dukes mercilessly repressed it, offering their subjects the alternative of renunciation or of exile: 30,000 Protestants chose exile. Religious liberty was not given till a little more than a century ago.—Pop. (1880) 1,213,597; (1890) 1,282,708; (1900) 1,356,494.

STYRIAN, n. *stĭr'ĭ-ăn:* native of *Styria*, in Austria: ADJ. pertaining to.

STYROLE, n. *stī'rōl* [L. *styrax*, storax; *ŏlĕum*, oil]: a peculiar oily substance obtained from liquid storax.

STYTHE, n. *stīth:* a miner's term for the stifling suffocating odor of choke-damp that follows an explosion of fire-damp.

STYX, *stĭks* [literally, 'the Hateful,' from Gr. *stug-*, to hate, abhor]: in historical times, a waterfall in Greece, near the town of Nonacris, in n.e. Arcadia; descending perpendicularly over lofty and precipitous rocks, and forming a small torrent which falls into the Akrata (anc. Crathis). The scenery around is weird and desolate, so that the ancient Greeks regarded the S. with superstitious awe, the water being supposed to be poisonous, and to break every vessel into which it was put, except those made of the hoof of a horse or an ass. It was reported that Alexander the Great had been poisoned by it. It is now called *ta Mauraneria* (the Black Waters), and also *ta Drakoneria* (the Terrible Waters)—the belief in its poisonous qualities still surviving.—In *mythology* (in Homer), the S. was one of the rivers of Hades, round which it flowed seven times, and over which Charon (q.v.) conveyed the shades of the departed: hence the name was applied sometimes to the infernal regions. As a goddess (in Hesiod), S. was daughter of Oceanus and Tethys, dwelling in a grotto at the entrance of Hades: the most solemn oaths of the gods were taken in her name, even as the ancient Arcadians used to swear on important occasions by the waters of the river Styx.

SUA'BIA: see SWABIA.

SUABLE, a. *sū'ă-bl:* see under SUE.

SUAKIN, *swä'kĭn*, or SUWAKIM, *sô-wä'kĭm*, properly SAWAKIN, *sä-wä'kĭn:* seaport town of Egypt and chief port of the Sudan; on a small rocky island off the w. coast of the Red Sea, but near the shore. It has an excellent harbor for small vessels, and till within a few years was defended by a number of detached forts, weak alike in construction and armament. It was ceded by Turkey to Egypt 1866. The town was formerly a noted slave-mart, and was known also as a stopping-place for pilgrims to and from Arabia. It was a main outlet for the Nile provinces. The export-trade at one time yielded an annual customs revenue of nearly $3,000,000; chief exports were ivory (govt. monopoly), gum, cotton, senna, sesame, and hides; and the local trade averaged nearly $5,000,000 per annum. The town contains the custom-house, govt. house, both fronting the sea, a bazaar, several mosques, the tomb of Sheik Ali, and a causeway uniting the island to the town of Al-Kaff. Since the British expedition thither 1884, six isolated forts have been built as an outer line of defense. El Mahdi (q.v.), and Osman Digna made S. the basis of their operations against Egypt and England 1888; and the combined forces of the two powers defeated the dervishes there in a stubborn battle Dec. 20.—Pop. 8,000.

SUAREZ, *swâ'rĕth*, FRANCISCO: one of the most renowned of modern scholastic and polemical Rom. Cath. divines: 1548, Jan. 5—1617, Sep. 25; b. at Granada. He was educated at the Univ. of Salamanca; but his early studies were singularly unpromising; and it is remarkables in the history of a man afterward so eminent, that it wa, not without difficulty, and after repeated trials, that he was admitted 1564 into the Soc. of the Jesuits. His later career, however, was brilliant, evincing intellectual powers of the highest order; and he taught philosophy and theology with remarkable success, first at Alcala, afterward at Salamanca, Rome, and Coimbra. The accounts of his assiduity in study are almost beyond belief: he is said to have habitually studied 17 hours a day. Of his power of memory, the accounts relate prodigies: he is said to have been able to repeat any portion of the whole 23 folio vols. of his own works, even to the quotations from the Fathers and other theological writers with which they abound. S. may be described as the last and greatest modern scholastic (see SCHOLASTICS), though it should be noted that in his works scholasticism appears in its best form; for though they abound in discussions uninteresting, indeed unintelligible, to persons unacquainted with scholastic terminology, yet they also exhaust on each subject the whole of the learning, ancient and modern, extant on that subject at their date. On the philosophy of the ancients especially, S. is copious and accurate; and of much modern German philosophy the germ is traceable in his account of the opinions of antiquity.

In philosophy, S. developed a modification of the Thomistic doctrine (see AQUINAS, THOMAS): he seems to have sought, in his doctrine of universals, a middle course between Duns Scotus (q.v.) and William of Occam (see OCCAM, WILLIAM OF: also NOMINALISM). In theology proper he accepted main elements from the doctrine of Luis Molina (q.v.), but reconciling these with the more orthodox doctrine. His scheme of reconciling the freedom of the will with the efficacy of grace, and of saving at the same time the doctrine of 'special election,' is called *Congruism* (see MOLINISM: also GRACE).—His writings in philosophical jurisprudence also were important.—His works were printed, 23 vols. folio, at Lyon, Mainz, and Venice. An ed. in 28 vols. 4to was completed at Paris 1861. His treatise *De Legibus* is much esteemed, and has been reprinted in England. S. died at Lisbon.—See Des Champs, *Vie de Suares* (4to Perpignan 1671).

SUASION, n. *swā'zhŭn* [L. *suāsus*, advised, exhorted; *suadĕō*, I advise]: act of persuading or advising. SUA'SIVE, a. *-zĭv*, having the power to persuade. SUA'SIVELY, ad. *-lĭ*.

SUAVE, a. *swāv* [F. *suave*—from L. *suāvis*, sweet]: pleasant in manner; agreeable: bland. SUAVITY, n. *swăv'ĭ-tĭ* [F. *suavité*—from L. *suavĭtātem*, pleasantness]: agreeableness of manners; pleasantness; urbanity.

SUB, *sŭb* [L.]: a prefix signifying 'under' or 'below;' beneath: *sub* denotes a less or inferior degree, or an imperfect state, of the quality expressed by the word before which it is placed: for the sake of euphony, the *b* in *sub* becomes *c, f, g, m, p,* or *s*, according to the first letter of the other part of the word, as in *succeed, suffer, suggest, summon, supplant, sustain*: N. in *familiar language*, a subordinate; one lower in rank.

SUBACID, a. *sŭb-ăs'ĭd* [L. *sub*, under, and *acid*]: moderately acid or sour: N. a substance moderately acid.

SUBACRID, a. *sŭb-ăk'rĭd* [L. *sub*, under, and *acrid*]: moderately pungent or acrid.

SUBACUTE, a. *sŭb'ă-kūt'* [L. *sub*, under, and *acute*]: acute in a moderate degree.

SUBAERIAL, a. *sŭb'ā-ē'rĭ-ăl* [L. *sub*, under, and *aerial*]: beneath the sky; in the open air.

SUBAGENT, n. *sŭb-ā'jĕnt* [L. *sub*, under, and *agent*]: a person employed by an agent to transact a part of his business.

SUBAH, n. *sō'bâ* [Pers. and Hind.]: province or viceroyship. SUBAHDAR, or SOUBAHDAR, n. *sō'bâ-dâr'* [Pers. *subah*, a province; *dâr*, holding, keeping]: under the old Mogul govt., a viceroy or gov. of a province; now in *India*, native officer with rank equivalent to a European captain. SU'BAHSHIP, n. jurisdiction of a subahdar. SUBAHDAR MAJOR, native commandant of a native infantry regiment.

SUBALTERN, n. *sŭb'ăl-tĕrn* [F. *subalterne*—from mid. L. *subalter'nus*, subordinate—from L. *sub*, under; *alter*, another: It. *subalterno*]: commissioned company officer in a regt. under the rank of capt.—i.e., a lieut.: ADJ. inferior; subordinate. SUBALTERN PROPOSITIONS, in *logic*, universal and particular propositions agreeing in quality, but not in quantity.

SUBALTERNATE, a. *sŭb-ăl-tĕr'nāt* [L. *sub*, under, and *alternate*]: successive; succeeding by turns; subordinate: in *logic*, a particular as opposed to a universal. SUBALTERN'ANT, n. *-tĕrn'ant*, in *logic*, a universal as opposed to a particular proposition. SUB'ALTERNA'TION, n. *-tĕr-nā'shŭn*, succession by course; state of inferiority.

SUBANGULAR, a. *sŭb-ăng'gū-lĕr* [L. *sub*, under, and *angular*]: slightly angular.

SUB-APENNINES, n. plu. *sŭb-ăp'ĕ-nīns* [L. *sub*, under, and *Apennines*]: in *geol.*, an extensive series of older and newer Pliocene beds which are amply developed along the whole extent of Italy on both flanks of the Apennines, and which form a line of low hills between the older chain and the sea.

SUBAQUEOUS, a. *sŭb-ā'kwĕ-ŭs*, or SUBAQUATIC, a. *sŭb'ă-kwăt'ĭk* [L. *sub*, under, and *aqueous*, or *aquatic*]: being or lying under water; formed in or under water.

SUBASTRINGENT, a. *sŭb'ăs-trĭn'jĕnt* [L. *sub*, under, and *astringent*]: astringent in a small degree.

SUBAXILLARY, a. *sŭb-ăks'ĭl-ĕr-ĭ* [L. *sub*, under, and *axillary*]: in *bot.*, placed under the axil or angle formed by a branch or leaf with a branch or stem.

SUB-BASE, n. *sŭb'bās* [L. *sub*, under, and *base*]: in *music*, the deepest pedal stop, or the lowest notes, of an organ.

SUBCALCAREOUS, a. *sŭb-kăl-kā'rĭ-ŭs* [L. *sub*, under, and *calcareous*]: somewhat calcareous.

SUBCARTILAGINOUS, a. *sŭb-kär'tĭ-lăj'ĭ-nŭs* [L. *sub*, under, and *cartilaginous*]: partially cartilaginous; under the cartilages of the chest.

SUBCAUDAL, a. *sŭb-kaw'dăl* [L. *sub*, under, and *caudal*]: beneath the tail.

SUBCENTRAL, a. *sŭb-sĕn'trăl* [L. *sub*, under, and *central*]: nearly central but not quite.

SUBCLASS, n. *sŭb'klăs* [L. *sub*, under, and *class*]: a subordinate class, consisting of orders allied to a certain extent.

SUBCLAVIAN, a. *sŭb-klā'vĭ-ăn* [L. *sub*, under; *clāvis*, a key]: in *anat.*, applied to an artery and muscle lying under the collar-bone.

SUBCOLUMNAR, a. *sŭb'kō-lŭm'nĕr* [L. *sub*, under, and *columnar*]: in *geol.*, not perfectly columnar.

SUBCOMMITTEE, n. *sŭb'kŏm-mĭt'tē* [L. *sub*, under, and *committee*]: an under or smaller committee.

SUBCONICAL, a. *sŭb-kŏn'ĭ-kăl* [L. *sub*, under, and *conical*]: conical in a slight degree.

SUBCONTRACT, n. *sŭb-kŏn'trăkt* [L. *sub*, under, and *contract*]: a contract taken under a previous contract. SUB'CONTRAC'TED, a. *-trăk'tĕd*, contracted after a former contract.

SUBCONTRARY, a. *sŭb-kŏn'trā-rĭ* [L. *sub*, under, and *contrary*]: contrary in an inferior degree; in *geom.*, applied to similar triangles having a common angle at the vertex while the bases do not coincide; in *logic*, applied to propositions which agree in quantity but differ in quality.

SUBCORDATE, a. *sŭb-kŏr'dāt* [L. *sub*, under, and *cordate*]: somewhat like a heart in shape.

SUBCOSTAL, a. *sŭb-kŏs'tăl* [L. *sub*, under, and *costal*]: under or internal to a rib.

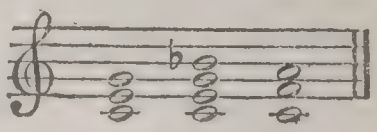
SUBCUTANEOUS, a. *sŭb'kū-tā'nĕ-ŭs* [L. *sub*, under, and *cutaneous*]: immediately under the skin.

SUBCUTICULAR, a. *sŭb'kū-tĭk'ū-lĕr* [L. *sub*, under, and *cuticular*]: under the cuticle or scarfskin.

SUBDEACON, n. *sŭb-dē'kn* [L. *sub*, under, and *deacon*]: an under-deacon or deacon's assistant: in *chh. hist.*, lowest rank in holy orders in the Roman Church; highest of the minor orders among the Greeks. In the Roman Church, subdeacons prepare the sacred vessels and the bread and wine for mass, pour the water into the chalice at the offertory, and sing the Epistle. There are no subdeacons in the Anglican Church.

SUBDEAN, n. *sŭb'dēn* [L. *sub*, under, and *dean*]: an under-dean; a dean's substitute. SUBDEAN'ERY, n. *-ér-ĭ*, the office and rank of subdean.

SUBDIVIDE, v. *sŭb'dĭ-vīd'* [L. *sub*, under, and *divide*]: to divide into smaller parts; to separate into smaller divisions. SUB'DIVI'SION, n. *-vĭzh'ŭn*, the part of a larger part.

SUBDOMINANT, n. *sŭb-dŏm'ĭ-nănt* [L. *sub*, under, and *dominant*], in Music: note below the dominant, the fifth below the key-note; the note whose dominant is the tonic. Thus F is the S. of C, and C of G. One of the keys most nearly related to any key is its S.; and the easiest of all modulations is that from a key to its S., which is effected by adding the dominant seventh to the common chord, and the resolution of this chord is the common chord of the S.; e.g., in modulating from the key of C to the key of its subdominant F, we have  .

See DOMINANT.

SUBDUCE, v. *sŭb-dūs'*, or SUBDUCT, v. *sŭb-dŭkt'* [L. *sub*, under; *ductus*, pp. of *duco*, I lead]: to withdraw; to subtract. SUBDU'CING, imp. SUBDUCED', pp. *-dūst'*. SUBDUC'TION, n. *-dŭk'shŭn*, the act of taking away or withdrawing.

SUBDUE, v. *sŭb-dū'* [OF. *subduzer*, to subdue—from L. *sub*, under; *ducĕrĕ*, to lead]: to conquer by force or superior power; to reduce under dominion; to disable from further resistance; to tame; to overcome; to soften. SUBDU'ING, imp. SUBDUED', pp. *-dūd'*. SUBDU'ER, n. *-dū'ér*, one who subdues. SUBDU'AL, n. *-ăl*, the act of subduing; conquest. SUBDU'ABLE, a. *-ă-bl*, that may be subdued.—SYN. of 'subdue': to conquer; overpower; surmount; vanquish; subjugate.

SUBDUPLICATE, a. *sŭb-dū'plĭ-kāt* [L. *sub*, under, and *duplicate*]: having the ratio of the square roots; in *math.*, applied to the ratio which the square roots of two quantities have to each other.

SUBEDITOR, n. *sŭb-ĕd'ĭ-tér* [L. *sub*, under, and *editor*]: an assistant-editor; an under-editor.

SUBERATE, n. *sū'bér-āt* [L. *sūber*, the cork-tree]: in *chem.*, a salt formed by suberic acid with a base. SUBERIC, a. *sū-bér'ĭk*, pertaining to cork; applied to an acid produced by the action of nitric acid on cork and fatty bodies. SUBERIN, n. *sū'bér-ĭn*, the cellular tissue of cork purified. SU BEROUS, a. *-ŭs*, or SU'BEROSE, a. *-ōz*, in *bot.*, having a corky texture.

SUBFUSK, or SUBFUSC, a. *sŭb-fŭsk'* [L. *sub*, under; *fuscus*, dark, dusky]: having a brownish color; in *Oxford Univ. slang*, dull in color, as clothes.

SUBGENUS, n. *sŭb-jē'nŭs* [L. *sub*, under, and *genus*, race, stock]: a subordinate genus comprehending one or more species. SUBGENERIC, a. *sŭb'jē-nĕr'ĭk*, pertaining to a subgenus.

SUBGLOBULAR, a. *sŭb-glŏb'ū-lĕr* [L. *sub*, under, and *globular*]: somewhat globular.

SUB-GOVERNOR, n. *sŭb-gŭv'ĕr-nĕr* [L. *sub*, under, and *governor*]: a deputy or vice-governor; a subordinate governor.

SUBGRANULAR, a. *sŭb-grăn'ū-lĕr* [L. *sub*, under, and *granular*]: somewhat granular.

SUBIACO, *sō-bē-ä'kō* (anc. *Sublaqueum*): city of the province of Rome, Italy; on a hill by the Teverone, 42 m. from Rome. S. has a fine cathedral, and many monuments of antiquity. There was a famous Benedictine monastery in S., and here, in the 15th c., one of the earliest printing-presses in Italy was established—Pop. (1881) commune 7,017.

SUBICULUM, n. *sŭb-ĭk'ū-lŭm* [L. *subĭc'ŭlum*, an underlayer]: in *bot.*, the filamentous mycelium of certain fungi; the hypothallus.

SUB-INVOLUTION, n. *sŭb-ĭn'vō-lō'shŭn* [L. *sub*, somewhat, and *involution*]: the state or condition of the womb when it does not return to its usual size after delivery, but is somewhat larger and heavier.

SUBITO, ad. *sō'bĭ-tō* [It., quickly—from L. *subitus*, sudden]: in *music*, suddenly; quickly.

SUBJACENT, a. *sŭb-jā'sĕnt* [L. *sub*, under; *jacens* or *jacen'tem*, lying; *jacĕrĕ*, to lie]: lying under or in a lower situation. SUBJA'CENTLY, ad. *-lĭ*.

SUBJECT, a. *sŭb'jĕkt* [L. *subjec'tus*, laid or placed under—from *sub*, under; *jactus*, thrown or cast; *jacĕrĕ*, to cast]: being or living under the power or dominion of another; placed or situated under; exposed; liable, either from extraneous or inherent causes; obedient; tributary: N. one who owes allegiance to a sovereign; one who lives under the dominion of another: that which is treated or handled in speaking, writing, art, etc.; materials; matter: a dead body for dissection; the theme; the topic; the hero of a piece: in *logic* and *gram.*, that part of a proposition concerning which anything is affirmed or denied: in *metaphysics* (see SUBJECTIVE: OBJECT). SUBJECT, v. *sŭb-jĕkt'*, to bring under; to subdue; to expose; to make liable; to put under or within the power of; to enslave; to cause to undergo; to submit; to make accountable; to make subservient. SUBJECT'ING, imp. SUBJECT'ED, pp. SUBJECTION, n. *sŭb-jĕk'shŭn*, state of being under the power, control, and government of another. SUBJECT'IVE, a. *-ĭv*, relating to the subject; derived from one's own consciousness, in distinction from external observation; in the *phil. of mind*, *subjective* denotes what is to be referred to the thinking subject, *objective* what belongs to the object of thought (see OBJECT). SUBJECT'IVELY, ad. *-lĭ*. SUBJECT'IVENESS, n. *-nĕs*, or SUBJECTIVITY, n. *sŭb'jĕk-tĭv'ĭ-tĭ*,

the state of being subjective; an author's individuality as shown in his works. SUBJECT-MATTER, n. the matter or thought under consideration. SUBJECTIVE SENSATIONS, sensations which originate in the brain.—SYN. of 'subject, a.': subordinate; inferior; exposed; obnoxious; liable; subservient.

SUBJECTED, a. *sŭb-jĕkt'ĕd:* a word in *Milton,* used in the sense of 'subjacent.'

SUBJOIN, v. *sŭb-joyn'* [L. *sub,* under, and *join*]: to add at the end; to affix; to attach. SUBJOIN'ING, imp. SUBJOINED', pp. *-joynd'.*—SYN. of 'subjoin': to annex; add; join; unite; coalesce.

SUBJUGATE, v. *sŭb'jū-gāt* [L. *subjugātus,* put under or attached to the yoke; *subjugārĕ,* to bring under the yoke—from *sub,* under; *jugum,* a yoke: F. *subjuguer*]: to subdue and bring under the yoke, power, or dominion of; to conquer by force. SUB'JUGATING, imp. SUB'JUGATED, pp. SUB'JUGATOR, n. *-gā-tĕr,* one who subjugates. SUB'JUGA'TION, n. *-gā'shŭn,* the act of subduing and bringing under the absolute control of another.—SYN. of 'subjugate': to conquer; vanquish; overcome; surmount; subject.

SUBJUNCTIVE, a. *sŭb-jŭngk'tĭv* [mid. L. *subjunctīvus,* subjunctive—from L. *sub,* under; *junctus,* pp. of *jungĕrĕ,* to join]: added to something before said or written; in *gram.,* applied to those parts of verbs which in composition follow and depend on other verbs, and express *contingency,* and which are usually preceded by *if, though, unless, except, until,* etc. SUBJUNC'TION, n. *-shŭn,* the act of subjoining or state of being subjoined.

SUBKINGDOMS, ANIMAL: great primary divisions of the animal world. The subkingdoms are termed also 'morphological types,' which term indicates their constitution more definitely than the name 'subkingdom.' As an example of the manner in which a 'sub-kingdom' of animals is constituted, we select that of the *Arthropoda,* a group of animals containing crustaceans, spiders, insects, and centipedes. These, united by Cuvier with the segmented worms to form the *Annulosa* or ARTICULATA (q.v.), are now accorded separate rank. A lobster may be selected as a typical example of this group. In the detailed examination of this animal, we may note that the jointed nature of the tail is perceptible in the forepart of the body, notwithstanding that the forepart consists apparently of a single piece. A further examination of the lobster's body would reveal the fact that each joint and its appendages—the latter being 'paired'—agrees in essential or fundamental structure with every other joint of the body. The investigation of the plan of structure of the lobster's frame would show the absence of an internal skeleton, also a very typical arrangement of parts. The *heart* lies dorsally, or on the back. The *digestive system* occupies a median position; and the *nervous system* lies ventrally, or on the floor of the body; the nerve-axis of the lobster further consists, typically, of a double chain of nervous masses (or *ganglia*) united by nervous cords, and

from which branches proceed to the various parts of the body. The ideas that we may gain regarding the *general type of structure* of the lobster's body, or plan on which that body is built up may be thus summarized: (1) The body is jointed; (2) the joints and their appendages are fundamentally similar or homologous; (3) the heart lies dorsally, the nervous system ventrally, while the digestive system occupies the median position; (4) the appendages are in pairs. Now, if we examine the body of any insect, we shall find it essentially to resemble that of the lobster in the general arrangement of its parts. The body of a spider or a scorpion exhibits a similar disposition of organs to that of the lobster, and shows a fundamentally similar structure beneath variations in appearance and form; a centipede's body also would be found constructed on the lobster type. The barnacles, water-fleas, crabs, and a whole host of animals more or less nearly allied to the lobster, and belonging to the lobster's class (that of the *Crustacea*), show a near relationship with the typical animal; while worms generally (leeches, earth-worms, etc.) would present a fundamental similarity in their characters to those described as existing in the lobster. We thus discover uniformity of type beneath variations in form and appearance, and it is exactly this broad structural likeness between apparently different animals which enables us to group them together to form 'subkingdoms' or 'types.' A subkingdom or type of animals may therefore be defined as consisting of a *number of animals whose bodies are constructed on the same fundamental plan.* The animal world has been thus divided into five or six subkingdoms. Between some of these groups recent research—influenced by the doctrine of evolution, unfavorable to the construction of defined subkingdoms or types—has claimed to find some connecting links. A classification long recognized was as follows:

I. PROTOZOA—Ex.: Sponges, infusoria, amœbæ, and other animalcular forms.

II. CŒLENTERATA—Ex.: Sea-anemones, corals, zoophytes, jelly-fishes, etc.

III. ECHINOZOA—Ex.: Sea-urchins, star-fishes, crinoids, sea-cucumbers, tape-worms, flukes, etc.

IV. ANNULOSA—Ex.: Worms, insects, centipedes, spiders, crustacea.

V. MOLLUSCA—Ex.: Sea-mats, sea-squirts, lamp-shells, shell-fish, cuttle-fishes.

VI. VERTEBRATA—Ex.: Fishes, amphibia, reptiles, birds, mammals.

For the present 7 or 8 subkingdoms, as given provisionally or by conflicting authorities, and for subdivisions, see ZOOLOGY.—Since the recent effort to find genetic connections among the different types of animals, the word subkingdom is regarded as somewhat old-fashioned and is often replaced by Branch or Phylum.

SUBLAPSARIAN, n. *sŭb'lăp-sā'rĭ-ăn* [L. *sub*, under, after; *lapsus*, fall]: term descriptive of one of the two sections in the school of theologians who maintain the doctrine of absolute divine decrees of Election and Reprobation. It is possible to conceive God making such a decree in two different ways—either (1) on the hypothesis of his foresight of the fall of Adam, and thus of man's original sin; or (2) independently of such foresight on his part, and without any reference to such foresight—i.e., entirely out of his own will and determination. The S. system supposes the first of these ways; and thus refers the eternal election or reprobation of men by God to his foreseeing (rather than his positively decreeing) that all men would fall in Adam, and thus would deserve eternal reprobation—the election of grace being simply a remedy for an existing evil. Out of the entire mass of mankind thus fallen, he in his sovereign grace freely elects a certain number to life; by virtue of which electing act, he in an equal exercise of his sovereignty leaves the others, non-elect, to the death which their sins deserve. The section of theologians maintaining the second of the two ways above noted are termed Supralapsarian (q.v.). This distinction is not confined to the Calvinistic schools; it is found also among Rom. Catholics. SUBLAPSARIAN, a. pert. to the doctrine of the Sublapsarians; done after the fall of man.

SUBLET, v. *sŭb-lĕt'* [L. *sub*, under, and *let*]: to let, as one tenant to another.

SUBLIEUTENANT, n. *sŭb'lū-tĕn'ănt* [L. *sub*, under, and *lieutenant*]: in the British navy, officer next below a lieut., formerly called Mate.—In the Brit. army, cornets and ensigns are now sub-lieutenants.

SUBLIMATE, v. *sŭb'lĭ-māt* [L. *sublimātus*, lifted up on high; *sublimārĕ*, to elevate—from *sublīmis*, lofty: It. *sublimare;* F. *sublimer*, to sublimate, to elevate]: to bring a solid substance directly into a vapor by heat—better in this sense, SUBLIME (q.v.): to refine and exalt; to elevate: N. the product of sublimation. SUB'LIMATE, a., or SUB'LIMATED, a. brought into a state of vapor by heat. SUB'LIMATING, imp. SUB'LIMATED, pp. SUB'LIMA'TION, n. *-mā'shŭn* [F.—L.]: operation of bringing a solid substance into the state of a vapor by heat, and condensing it again; act of improving or purifying; that which is refined and purified (see below). BLUE SUBLIMATE, a preparation of mercury, sulphur, and sal-ammoniac, used in painting. CORROSIVE SUBLIMATE, a very poisonous preparation of mercury.

SUBLIMA'TION: chemical process similar to distillation, but differing from it in the nature of the substances to which it is applied. In distillation, *liquids* are converted by the agency of heat into vapor, which is condensed in the liquid form usually by the cooling action of water: in sublimation, *solid* bodies are reduced by heat to the state of vapor, which reassumes the solid form on cooling S. is conducted usually in a single vessel of glass or iron, the

product being deposited in the upper part of it in a solid state, while the impure residue remains at the bottom; but in the case of sulphur, the vapor is condensed on the walls of a large chamber. Iodine affords a good example of S.: on gently heating the lower part of a Florence flask containing a little of this substance, a purple vapor rises, which almost immediately condenses in small brilliant dark-purple crystals in the upper parts of the flask, while any impurity that may be present remains at the bottom. Among substances obtained by this process, and employed in the Pharmacopœia, are arsenious acid, benzoic acid, corrosive sublimate, and sublimed sulphur.

SUBLIME, a. *sŭb-līm'* [F. *sublime*—from L. *sublīmis*, exalted, high: It. *sublime*]: elevated aloft; very high in excellence; lofty in style or sentiment; grand; lofty in mien; majestic; in *OE.*, elevated by joy: V. to reduce a solid substance directly into a state of vapor by heat, to be again brought to a solid state by cooling (see SUBLIMATION): to exalt; to improve. SUBLI'MING, imp.: ADJ. elevating; refining: N. act or process of Sublimation (q.v.). SUBLIMED, pp. *-līmd'*: ADJ. elevated. SUBLIME'LY, ad. *-lĭ*. SUBLIM'ITY, n. *-lĭm'ĭ-tĭ*, or SUBLIME'NESS, n. *-līm'nĕs*, lofty height; loftiness of style or sentiment; moral grandeur; vastness; lofty grandeur, whether exhibited in the works of nature or art; the astonishment and awe impressed on the mind by the contemplation of the lofty or grand in nature or art, or of exalted excellence. THE SUBLIME, the surpassing grand in nature or art, as distinguished from *the beautiful* (see below): a grand or lofty style.—SYN. of 'sublime, a.': grand; exalted; lofty; noble; imposing; magnificent; splendid; stately; august; superb.

SUBLIME': term applied to objects indicating great Power, vast Expanse, or lofty Elevation, which excite in the beholder a feeling of pleasurable elation: the term 'sublime' is applied also, loosely, to the feeling.

The precise quality in things that arouses this mode of pleasurable excitement has been variously assigned. According to Burke, *terror* is, in all cases whatsoever, either openly or latently the ruling principle, or, at all events, one of the chief sources of Sublimity: Blair suggested that *mighy power or force* is the cause; Payne Knight ascribed it to *mental energy*; Kaimes considers it due to *height or elevation;* Dugald Stewart, in an elaborate essay, affirms that *elevation* is the leading characteristic, and that expanse and power are sublime by suggesting or implying great height; Sir W. Hamilton says that Sublimity requires *magnitude* as its condition, and exists in three forms—Space, Time, and Power.

The feeling also has been described variously: if this could be fixed, we should have a key to the objective quality. Longinus characterized it, in reference to literary composition, as 'filling the reader with a glorying, and sense of inward greatness.' Some would call it a 'sense of security' in circumstances of terror or danger. Hamilton describes it as 'a mingled feeling of pleasure and pain —pleasure in the consciousness of the strong energy,

pain in the consciouness that this energy is vain.' The connection with the sentiment of Power is generally admitted; but as the comparison of the object with self suggests our own littleness at the same time, there may be doubt whether the emotion is due to the Power, to the Littleness, or to the combination of both.

Referring to the generic sentiment of Power, which is evidently at the foundation, we find that the feeling of superior might in ourselves is cheering, elating, stimulating; and that the sense of littleness or inferiority is a depressing and enfeebling state of mind, a state of pure pain, redeemable in certain circumstances by other feelings, as when our inferiority is only in the comparison with an object of love or veneration, or when it is the condition of some compensating superiority—'the courtier stoops to rise.' The presumption, therefore, is that the elation of the Sublime is connected with the notion of Power. It may be felt though the power is not actually possessed, but imagined, borrowed, or conceived, through a sort of sympathy with the *appearances* of great power or might. If this account of the feeling be correct, Power must be a principal quality in its objects; and if with this there be combined voluminous sensation (and the corresponding ideas, vastness of expanse and greatness of time), the explanation of the Sublime in all its forms may probably be attained.

SUBLINGUAL, a *sŭb-lĭng'gwăl* [L. *sub*, under; *lingua*, the tongue]: situated under the tongue.

SUBLOBULAR, a. *sŭb-lŏb'ū-lĕr* [L. *sub*, somewhat, and *lobular*]: small veins of the liver on which the lobules rest, and into which the intralobular veins pour their blood.

SUBLUNAR, a. *sŭb-lō'nĕr*, or SUBLU'NARY, a. *-nĕr-ĭ* [L. *sub*, under; *luna*, the moon: It. *sublunare;* F. *sublunaire*]: *lit.*, situated under the moon; pertaining to this world; terrestrial. SUBLU'NARY, n. in OE., anything worldly.

SUBLUXATION, n. *sŭb-lŭks-ā'shŭn* [L. *sub*, under, and *luxation*]: in *surg.*, an incomplete dislocation; a violent sprain.

SUBMARINE, a. *sŭb'mă-rēn'* [L. *sub*, under, and *marine*]: under the sea; submerged; applied to objects situated at some depth in the waters of the sea, or covered by the waters of the ocean. SUBMARINE CABLE, cable laid on the sea-bottom inclosing telegraph wires.

SUBMARINE' FORESTS: term applied to the stools of trees which occupy the sites on which they grew, usually rooted in impure peat; but, by change of level, the ancient forest surfaces are now covered by the tide even at low water. No kind of tree has been found in these forests which does not exist at the present day in the country, and the underwood and herbaceous plants, so far as determined, agree specifically with those found now in similar localities. Submarine forests belong to the Recent or Quaternary period, and occur above the Bowlder Clay. Examples occur on the coast of N. J. and elsewhere on coasts undergoing subsidence. Subaqueous remains of

forests are found also in some lakes and rivers, e.g., on the Columbia river; these may result from rise of water-level by obstruction, or, in some cases, from local subsidence due to earthquakes or other causes.

SUBMARINE NAVIGATION: movement under water in closed ships or boats; suggested by the Diving-bell (q.v.), which showed that air for respiration can be supplied to persons placed in adequately arranged vessels under water. Cornelius Drebell, in England, made a vessel to be rowed under water in the time of James I. An inventor named Bushnell, of Conn., 1775, and Robert Fulton about 1796, contrived submarine vessels, for use in warfare. The vessel patented 1859 by Delaney of Chicago was egg-shaped in transverse section, and diminished nearly to a point at each end. It had two iron tanks in the interior; one had air forced into it by an air-pump; the second contained water. By pumping water into or out of the second tank, with the action of the air in the first, the boat could be raised or lowered to different depths.

In recent years, naval constructors and inventors have endeavored to devise some form of small submarine boat which could be used in war for placing torpedoes under ships. Such a vessel could approach its victim unseen, and would be protected from attack to a great extent by the water in which it would be immersed. Among earlier inventors who have gone so far as to have actual boats constructed is the Rev. G. W. Garrett, of England. His vessel, the *Alarm*, was experimented with 1880–82, and attained some success. It had a double-ended cigar-shaped hull, and was propelled by a screw.—In this country, some interest was excited by the trials 1885–6 of J. L. Tuck's submarine boat, the *Destroyer*. This vessel was of iron, with double-ended hull, not of the cigar type, 30 ft. long, 7½ ft. wide, and 6 ft. deep. The motive-power, in the latest form was a steam-engine supplied with steam from a caustic-soda boiler, in which the heat was produced by action of the exhaust steam on caustic soda. Ballast tanks were provided, but her final immersion was mechanical, and was effected by horizontal rudders. About the same time the Nordenfeldt boat was under trial in Europe. This boat had a double-ended cigar-shaped hull, 61 ft. long and 9 ft. diameter. The screw for propelling was 5 ft. diameter and 7 ft. 6 in. pitch. The boilers were heated by a regular fire. For submarine work the fires were stopped, and the reserve of steam alone was relied on. Two vertical screws were carried in sponsons at each side to sink the boat, and automatic provision was made to stop their motion at any desired depth. Two horizontal rudders, automatically controlled, acted to preserve her horizontal position. 150 lbs. steam-pressure to the sq. in. was the starting-point for submarine work; and it was stated that a speed of three knots could, with this pressure, be maintained for 16 m. Since the first trial, the boat has been increased in size and capability. Her regular surface-speed was about 8 knots.—The Russian govt. 1881 began an investigation of the merits of the Goubet

torpedo-boat. This vessel had a cigar-shaped double-ended hull. One of the trial vessels was 16 ft. long, 5¾ ft. high, and 3¼ ft. wide. The propelling mechanism was a screw driven by a compressed-air motor; also a species of oars with blades collapsing on the return stroke, was provided for propulsion.—More recently the Spanish govt. has been experimenting with a submarine vessel, the *Peral*, which, it is claimed, attained considerable success. This boat had an air-funnel the end of which was kept constantly above the surface, so that it was not absolutely a submarine vessel. —The French govt. has for many years conducted extensive trials with the *Gymnotus*, which embodies the work of several inventors and engineers.—Dupuy de Lome, Zede, Krebs, and others. The original vessel was tried 1876; and a new *Gymnotus* was launched 1888, Sept. 24. It is of the cigar-shaped double-ended type, 65½ ft. long, 6 ft. diameter, and is of steel, weighing 37,400 lbs. It has vertical and horizontal rudders, and is driven by a 5-ft. screw, actuated by a Krebs 60 horse-power electric motor. The electric energy is supplied by 564 alkaline liquid storage cells weighing more than 21,000 lbs. It is said to be able to maintain a speed of 10 m. an hour for 6 hours. Great success is claimed for it.

A general feature of these vessels is a small covering dome, usually amidships, which may be just large enough to receive the head of the officer in charge, and which is provided with windows or dead-lights: sometimes it contains reflectors, as in the *Gymnotus*.

In the U. S. considerable experimenting has been done with submarine boats. The *Holland* was officially tested in N. Y. harbor 1898, Nov. 12, and proved very successful, reversing, firing torpedoes, diving and rising under full speed when submerged. The *Fulton*, a somewhat larger boat, was tested in 1901, Nov., its crew remaining submerged for 15 hours without suffering any inconvenience. In 1903 there were 8 submarine boats in service or under construction for the U. S. Navy.

SUBMAXILLARY, a. *sŭb-măks'ĭl-ĕr-ĭ* [L. *sub*, under, and *maxillary*]: lying beneath the jaw. SUBMAXILLARY GANGLION (see NERVOUS SYSTEM [7th page]: SALIVARY GLANDS).

SUBMEDIAL, a. *sŭb mē'dĭ-ăl*, or SUBME'DIAN, a. *-ăn* [L. *sub*, under; *medĭus*, the middle]: lying under or below the middle of the body. SUBME'DIANT, n. *-ănt*, in *music*, the middle note between the octave and subdominant.

SUBMENTAL, a. *sŭb-mĕn'tăl* [L. *sub*, under; *mentum*, the chin]: in *anat.*, situated under the chin; applied to a branch of the external maxillary artery.

SUBMERGE, v. *sŭb-mĕrj'* [F. *submerger*—from L. *sub*, under; *mergĕre*, to immerse]: to put under water; to drown; to cover or overflow with water; to sink or plunge under water. SUBMERG'ING, imp. SUBMERGED, pp. *sŭb-mĕrjd'*: ADJ. under water. SUBMERG'ENCE, n. *-mĕrj'ĕns*, the act of putting under water; state of being under water; in *geol.*, applied to all sinkings of the land whereby its surface is brought under the waters of the ocean.

SUBMERSED, a. *sŭb-mĕrst'* [L. *sub*, under; *mersus*, dipped or plunged; *mergĕrĕ*, to dip]: being or growing under water, as the leaves of aquatic plants. SUBMER'SION, n. *-mĕr'shŭn* [F.—L.]: the act of putting under water; the state of being put under water or other fluid; the act of causing to be overflowed; act of drowning.

SUBMETALLIC, a. *sŭb'mĕ-tăl'ĭk* [L. *sub*, under, and *metallic*]: imperfectly metallic.

SUBMISSION, n. *sŭb-mĭsh'ŭn* [L. *submissĭō* or *submissĭōnem*, a letting down—from *sub*, under; *missus*, pp. of *mittĕrĕ*, to send]: the act of yielding to power or authority; acknowledgment of inferiority or dependence; humble or suppliant behavior; resignation. SUBMIS'SIVE, a. *-mĭs'sĭv*, yielding one's will to the will or power of another; acknowledging one's inferiority; compliant; modest. SUBMIS'SIVELY, ad. *-lĭ*. SUBMIS'SIVENESS, n. *-nĕs*, quality of being submissive; acknowledgment of inferiority; confession of fault or blame.—SYN. of 'submissive': obedient; humble; yielding; dutiful; obsequious; subservient; passive; patient.

SUBMIT, v. *sŭb-mĭt'* [L. *sub*, under; *mitto*, I send]: to yield or surrender to the power or will of another; to leave or refer to the judgment of another; to cease to resist; to comply; to yield without murmuring; to surrender; to yield; to be subject. SUBMIT'TING, imp. SUBMIT'TED, pp. SUBMIT'TER, n. *-tĕr*, one who submits.

SUBMUCOUS, a. *sŭb-mū'kŭs* [L. *sub*, under, and *mucous*]: applied to a coat of the small intestine, connected more firmly with the mucous than with the muscular coat, between which two it is placed.

SUBMULTIPLE, n. *sŭb-mŭl'tĭ-pl* [L. *sub*, under, and *multiple*]: such a part of a number or quantity as can be contained in it an exact number of times; an aliquot part.

SUBNARCOTIC, a. *sŭb'nâr-kŏt'ĭk* [L. *sub*, under, and *narcotic*]: moderately narcotic.

SUBNASCENT, a. *sŭb-năs'ĕnt* [L. *sub*, under; *nascens* or *nascen'tem*, growing; *nasci*, to grow]: growing underneath.

SUBNORMAL, n. *sŭb-nŏr'măl* [L. *sub*, under, and *normal*]: in *conic sections*, the part of a diameter intercepted between the ordinate and the normal.

SUBNUDE, a. *sŭb-nūd'* [L. *sub*, under; *nudus*, naked]: in *bot.*, almost naked or bare of leaves.

SUBOCCIPITAL, a. *sŭb'ŏk-sĭp'ĭ-tăl* [L. *sub*, under, and *occipital*]: applied to a branch of the first spinal nerve which runs under the back of the head.

SUBOCTAVE, n. *sŭb-ŏk'tăv* [L. *sub*, under, and *octave*]: an eighth part or octave. SUBOC'TUPLE, a. *-tū-pl* [L. *sub*, under, and *octuplus*, eightfold]: containing one part of eight.

SUBORDINATE, a. *sŭb-ŏr'dĭ-nāt* [L. *sub*, under, and *ordinate*]: inferior in nature, rank, or importance; descending in a regular series: N. one who stands in rank or dignity below another: an inferior person: V. to place in order

or rank below another; to consider of less value or importance; to make of less value; to bring under control. SUBOR'DINATING, imp. SUBOR'DINATED, pp. SUBOR'DINATELY, ad. *-lĭ*, in a lower rank; of inferior importance. SUBOR'DINA'TION, n. *-nā'shŭn* [F.—L.]: inferiority of rank or dignity; place of rank among inferiors; a series regularly descending. SUBORDINARY, or SUBORDINATE ORDINARY, in *heraldry*, class of charges formed mostly of straight or curved lines. The following are generally so classed: the Bordure, Orle, Tressure, Flanche, Pile, Pall, Quarter, Canton, Gyron, Fret, Inescutcheon, Lozenge, Fusil, Mascle. See these titles: also ORDINARIES.

SUBORN, v. *sŭb-ŏrn'* [F. *suborner*, to suborn—from L. *subornārĕ*, to fit out secretly—from *sub*, under; *ornārĕ*, to fit out: It. *subornare*]: to procure privately or by indirect means; to employ a person to take a false oath; to incite one to commit perjury; to bribe. SUBORN'ING, imp. SUBORNED', pp. *-ŏrnd'*. SUBOR'NER, n. *-ŏr'nĕr*, one who procures another to take a false oath or do a bad action. SUBORNATION, n. *sŭb'ŏr-nā'shŭn* [F.—L.]: crime of procuring a person to take such a false oath as to constitute Perjury (q.v.); crime of procuring any one to do a bad action. Subornation of perjury is a misdemeanor punishable anciently by death; afterward banishment, or cutting out of the tongue; then forfeiture of goods; latterly, as at present, by fine and imprisonment.

SUBOVATE, a. *sŭb-ō'vāt* [L. *sub*, under, and *ovate*]: nearly in the shape of an egg.

SUBPANATION, n. *sŭb-pā-nā'shŭn* [L. *sub*, under, and *panis*, bread]: doctrine that Christ's body and blood are locally and materially present in the eucharist under the form of bread and wine.

SUBPEDUNCULATE, a. *sŭb'pĕ-dŭng'kū-lāt* [L. *sub*, under; *pedun'cŭlus*, a little foot, a foot-stalk—from *pes* or *pĕdem*, a foot]: in *bot.*, supported upon a very short stem.

SUBPERITONEAL, a. *sŭb-pĕr'ĭ-tō-nē'ăl* [L. *sub*, under, and *peritoneal*]: in *anat.*, applied to a layer of areolar tissue, distinct from the abdominal fasciæ, by which the parietal portion of the peritoneum is connected loosely with the fascia lining the abdomen and pelvis.

SUBPŒNA, n. *sŭb-pē'nă* [L. *sub*, under; *pœna*, pain, penalty]: in *law*, the writ or process by which the attendance of a witness in a court of justice is compelled, commanding him to lay aside his business and all excuses, and attend at the time and place indicated, under a penalty. If the witness is required to produce a document, the writ is called a *subpœna duces tecum*. If the witness does not attend, and has not a good legal excuse, such as dangerous illness, he may be sued in an action of damages, or committed to prison. SUBPŒNA, v. to serve with a writ of subpœna, SUBPŒ'NAING, imp. *-nă-ĭng*. SUBPŒ'NAED, pp. *-nād*, served with a writ to attend a court as a witness, etc.

SUBPREFECT, n. *sŭb-prē'fĕkt* [L. *sub*, under, and *prefect*]: an under or assistant prefect. In France the administrative officer of an arrondissement.

SUBPRIOR, n. *sŭb-prī'ŏr* [L. *sub*, under, and *prior*]: one who assists the prior.

SUBQUADRATE, a. *sŭb-kwŏd'rāt* [L. *sub*, under, and *quadrate*]: nearly square.

SUBQUADRUPLE, a. *sŭb-kwŏd'rû-pl* [L. *sub*, under, and *quadruple*]: containing one part of four.

SUBROGATION, n. *sŭb'rō-gā'shŭn* [L. *sub*, under, and *rogation*]: in *law*, the substitution of one person in the place of another; especially, the substitution of a third party in the stead of a creditor—the subrogated person succeeding to the rights and securities of the original creditor. S. is originally a term of the Roman law, in which it expresses the legal fiction whereby an obligation extinguished by payment made by a third party is considered as persisting in favor of this third party, who in the eyes of the law is now one same person with the creditor. In the United States, 'under the initial guidance of Chancellor Kent,' says Sheldon (*Subr.*, §1), 'its principles have been more widely developed than in England. It is treated as the creature of equity, and is so administered as to secure real and essential justice.... It is broad enough to include every instance in which one party pays a debt for which another is primarily answerable.'

SUB ROSA, *sŭb rō'zâ* [L. under the rose]: phrase meaning between ourselves, or in secrecy. It was customary among the ancient Germans, on festive occasions, to suspend a rose from the ceiling above the table, as a symbol that whatever was said or done during the feast by those present would be afterward forgotten, or at least be kept as a secret among themselves.

SUBSALT, n *sŭb'sawlt* [L. *sub*, and *salt*]: a salt having an excess of the base.

SUBSCAPULAR, a. *sŭb skăp'ū-lĕr* [L. *sub*, and *scapular*]: in *anat.*, applied to the large branch of the axillary artery, rising near the lowest margin of the scapula.

SUBSCRIBE, v. *sŭb-skrīb'* [L. *subscrībĕrĕ*, to write underneath—from *sub*, under; *scrībo*, I write]: to sign with one's own hand; to attest, as a document, by writing underneath; to give or contribute by writing one's own name; to promise to give a sum of money by writing one's name in a book or on a paper, called a *subscription book* or a *subscription paper;* to assent; in *OE.*, to submit. SUBSCRI'BING, imp. SUBSCRIBED', pp. *skrībd'*. SUBSCRI'BER, n. *-bĕr*, one who contributes to any object, or for any particular purpose; one who promises to take and pay for a newspaper, periodical, or book by entering his name. SUBSCRIP'TION, n. *-skrĭp'shŭn*, the act of subscribing; the name subscribed or written; a signature; consent or attestation by writing the name (see SUBSCRIPTION, in Law): the act of giving money for any undertaking; the money so given; in *OE.*, submission; obedience.

SUBSCRIPTION, in Law: the placing of one's signature at the end of an engagement written or printed, or at the end of an attestation: an illiterate person makes a sufficient S. by inscribing his mark. The name of the act of subscribing has both in legal and popular use passed over to the subject-matter of the engagement: thus the money that a person contracts to supply for a charitable end, or to pay for a newspaper or for a book, is a S. One who subscribes for shares of a chartered company is held in law to make good his subscription. The law as to subscriptions for charitable objects is unsettled; but whenever, on the faith of funds subscribed, liabilities are incurred, the subscribers are held to carry out their engagements.

SUBSECTION, n. *sŭb-sĕk'shŭn* [L. *sub*, under, and *section*]: a subdivision; the part or division of a section.

SUBSELLIA, n. plu. *sŭb-sĕl'lĭ-ă* [L. *subsellĭum*, a low bench or form—from *sub*, under; *sella*, a seat]: certain small shelving seats in the stalls of cathedral and other churches; also called *misereres*.

SUBSEMITONE, n. *sŭb-sĕm'ĭ-tōn* [L. *sub*, under, and *semitone*]: in *music*, the seventh note of the diatonic scale.

SUBSEQUENT, a. *sŭb'sē-kwĕnt* [L. *subsĕquens* or *subsĕquentem*, following close after—from *sub*, after; *sequor*, I follow]: coming or being after; following in time; succeeding. SUB'SEQUENTLY, ad. *-lĭ*, at a later time; so as to follow in train.

SUBSEROUS, a. *sŭb-sē'rŭs* [L. *sub*, under, and *serous*]: applied to the connective tissue beneath the serous membranes.

SUBSERVE, v. *sŭb-sĕrv'* [L. *subservīrĕ*, to be subject to—from *sub*, under; *servĭō*, I serve]: to serve in subordination to; to serve in an inferior capacity; to help forward; to promote. SUBSERV'ING, imp. SUBSERVED', pp. *-sĕrvd'*. SUBSER'VIENT, a. *-sĕr'vĭ-ĕnt* [L. *sub*, under; *servĭens* or *servĭen'tem*, serving]: serving to promote some particular purpose or end; subordinate; useful as an instr. to promote a purpose; meanly complying; truckling. SUBSER'VIENTLY, ad. *-lĭ*. SUBSER'VIENCE, n. *-ĕns*, or SUBSER'VIENCY, n. *-ĕn-sĭ*, instrumental fitness; use or operation that promotes some purpose; servility.

SUBSESSILE, a. *sŭb-sĕs'ĭl* [L. *sub*, somewhat, and *sessile*]: in *bot.*, nearly sessile; almost without a stalk.

SUBSIDE, v. *sŭb-sīd'* [L. *subsīdĕrĕ*, to settle or sink down—from *sub*, under; *sīdo*, I settle; allied to *sedĕō*, I sit]: to sink or fall to the bottom; to settle; to fall into a state of quiet; to become tranquil; to abate. SUBSI'DING, imp.: ADJ. slowly and gradually sinking. SUBSI'DED, pp. SUBSI'DENCE, n. *-dĕns*, or SUBSI'DENCY, n. *-dĕn-sĭ*, the act or process of sinking or settling down to a lower level.

SUBSIDIARY, a. *sŭb-sĭd'ĭ-ĕr-ĭ* [F. *subsidiaire*—from L. *subsidiārĭus*, belonging to a reserve, subsidiary—from *subsidium*, a body of reserve, support (see SUBSIDY)]: assisting; furnishing help or additional supplies: N. an assistant; he or that which contributes aid.

SUB'SIDIES: term in politics, used in various senses —(1.) In English political history, taxes levied not immediately on property, but on persons, classed according to their reputed estates in lands or goods; or customs imposed on any of the staple commodities in addition to the *costuma magna et antiqua*. Thus, 30,000 sacks of wool were granted to Edward III., 1340, in aid of the war with France. S. were granted on various occasions to James I. and Charles II.—(2) In international affairs, money paid by one state to another to procure a limited succor of auxiliary troops, ships of war, milit. supplies, or provisions. In the war with the revolutionists of France and Napoleon I., Great Britain furnished S. to foreign powers to a large extent, to engage them to resist the progress of the French. In questions regarding S., it is held that the state furnishing the succor does not thereby become the enemy of the opposite belligerent: it may remain neutral in all respects, except as regards the auxiliary forces supplied; e.g., the confederate cantons of Switzerland, while granting troops to various European powers, preserved a rigorous neutrality. The service of Swiss regiments abroad is no longer sanctioned.—(3) In governmental relations to commerce, etc., money granted by legislative act for creating or encouraging some undertaking important for the public interests; e.g., for establishing or aiding to maintain lines of steamships—thus encouraging and stimulating trade or commerce. It is argued that, though a general system of permanent S. is to be avoided, each case should be judged according to the present expediences indicated by the time and the circumstances. See BOUNTY: MONOPOLY: PATENT.

SUBSIDY, n. *sŭb'sĭ-dĭ*, SUB'SIDIES, n. plu. *-sĭ-dĭz* [F. *subside*, a subsidy—from L. *subsidium* aid, succor—from *sub*, under; *sedeō*, I sit]: aid in money granted to a govt. through certain special taxes levied on classes of persons or on classes of goods: money granted from one state to another by treaty for aid in war: in general, money furnished for a particular purpose (see SUBSIDIES). SUB'SIDIZE, v. *-dīz*, to furnish with a subsidy; to obtain aid from another by the payment of a sum of money. SUB'SIDIZING, imp. SUB'SIDIZED, pp. *-dīzd*.

SUBSIST, v. *sŭb-sĭst'* [F. *subsister*, to subsist—from L. *subsistĕrĕ*, to remain standing—from *sub*, under; *sistĕrĕ*, to cause to stand]: to retain the present state; to have existence; to live; to be maintained, as with food and clothing; to have existence by means of something else; to inhere; to feed; to maintain, as to *subsist* an army. SUBSIST'ING, imp. SUBSIST'ED, pp. SUBSIST'ENCE, n. *-ĕns* [F. *subsistance*]: the means of living or supporting life; livelihood; support. SUBSIST'ENT, a. *-ĕnt*, having real being; inherent.—SYN. of 'subsistence': living; maintenance; sustenance; aliment.

SUBSOIL, n. *sŭb'soyl* [L. *sub*, under, and *soil*]: the soil lying under the surface-soil; the stratum of earth lying between the upper soil and the rocks.

SUB'SOILING: method of plowing (see PLOW) by which a layer of ground immediately under the stratum of productive soil is loosened and partially pulverized. On light land lying upon a porous subsoil the operation would be of no benefit, and in some cases would be positively injurious; but on firm soils overlying an impervious subsoil it is often highly beneficial. The effects of S. depend greatly on the time and manner of the work. Lands that will be highly benefited by S. at the right time may be seriously injured if the operation is performed when they are too dry or too wet. By breaking the hard substratum of ground, S. allows the escape of surplus water, which otherwise would soak the surface-soil to the great detriment of growing plants, make cultivation difficult, and could be removed only by the slow process of evaporation; while in time of drought, S. allows the water, which the subsoil then holds like a sponge, to be drawn upward by capillary attraction. Thus, on soils of this kind, S. proves highly beneficial in both wet and dry seasons. There is the additional advantage of a much wider range for the roots of plants than could otherwise be secured. S. is done by means of implements for this special purpose (see PLOW).—See SOIL.

SUBSPECIES, n. *sŭb-spē'shēz* [L. *sub*, under, and *species*]: a division of a species; a variety.

SUBSTANCE, n. *sŭb'stăns* [F. *substance*—from L. *substantia*, that of which a thing consists, material—from *sub*, under; *sto*, I stand]: the essence or material of a thing; the main part; that which really exists, whether matter or spirit; body; something real or solid; goods; wealth; means of living; in *philosophy*, that which exists absolutely and of itself; the basis of attributes—thus forming the correlative of *attribute* (see below). SUBSTANTIAL, a. *sŭb-stăn'shăl* [L. *substantiālis*]: actually existing; not seeming or imaginary; having substance or strength; material; stout; solid; having considerable wealth. SUBSTAN'TIALLY, ad. *-li*, really; essentially. SUBSTAN'TIALNESS, n. *-nĕs*, or SUBSTAN'TIAL'ITY, n. *-shĭ-ăl'ĭ-tĭ*, state of real existence; materiality. SUBSTAN'TIALS, n. plu. *-shălz*, essential parts. SUBSTAN'TIATE, v. *-shĭ-āt*, to establish by proof or competent evidence; to make good; to verify. SUBSTAN'TIATING, imp. SUBSTAN'TIATED, pp. SUBSTANTIVE, a. *sŭb'stăn-tĭv*, solid; real; essential: N. in *gram.*, that part of speech which expresses something that exists, materially or immaterially; a noun or name.

SUB'STANCE: term prominent in certain discussions in Logic and Metaphysics. S. is correlative with Quality or Attribute: every S. must have attributes, and every attribute must be the atribute of some S. The S. gold has the attributes weight, color, etc. But as every power or property of a thing, every way in which the thing affects us, may be called an attribute or quality, if all the attributes are counted off, there is nothing left; and the question then arises: What is the *substance?* To avoid this seeming inconsistency, it was assumed that everything whatsoever possesses, besides its

attributes, an unknown substratum that they rest upon or inhere in—a mystical and inscrutable bond, that holds the attributes together without being itself an attribute. To avoid this gratuitous assumption, Locke and others found a meaning for S. without departing from the knowable. Every object has some *essential* or *fundamental* quality, which being present, the object preserves its identity; and which being removed, the object is no longer the same object, but another. Thus, the S. of Body or Matter is not the remnant after all the qualities are subtracted; it is the two fundamen al and inerasable qualities Extension and Resistance. Size, shape, color, heat, odor, etc., all may be varied; but so long as Extension and Resistance, in any degree are found, we have a piece of matter. (The weak point in this theory—at least in this illustration of it—is, that size, shape, color, heat, odor, etc., all may be included in or resolved into Extension and Resistance; and that, though the former qualities are indeed variable, the latter likewise are variable.) Applying the same view of Locke to the mind, the S. of Mind is whatever we regard as its fundamental essence or distinguishing marks: we may adopt Feeling, or Volition, or Intellect, or require a share of all three, according to our mode of defining the mind. It would, then, be a confusion of language to talk of Feeling, Volition, and Intellect as *inhering* in mind; they *are* mind.

Notwithstanding the obviousness of this explanation, the use of the terms S. and Attribute has led to such inveterate demand for something that shall underlie all attributes—a S. of body, and a S. of mind—distinct from anything meant by the names, that many philosophers have considered it necessary to preserve the idea of S. as a thing of belief, if not of knowledge. The doctrine of an unknowable S. in the abstract very early allied itself with the theory then in vogue as to the Perception of a material world (see PERCEPTION), and the same arguments are good for or against both. Other names for expressing the same contrast are *noumenon* and *phenomenon*. The Phenomenon is what shows itself to our senses, or is conceived by our intelligence—the qualities of Extension and Resistance in body; and of Feeling, etc., in mind. The Noumenon is something apart and beyond, something inconceivable and unknowable, but which, say some, we are instinctively led to believe in. Thus, in the great question above alluded to—the belief of an independent material world—the phenomenal manifestations are inextricably involved with our mental powers of conceiving, and would vary if these powers were to vary; consequently they cannot be the absolute, independent, self-existent reality; which brings one school of philosophy to the expedient of believing in such a reality, though it is incomprehensible and indefinable by man's present powers—since, as they say, it is *apprehensible* by man.

SUBSTANTIA, n. *sŭb-stăn'shĭ-a* [L.]: ultimate substance upon which the properties of matter rest.

SUBSTANTIALISM, *sŭb-stăn'shal-ĭzm*: in modern metaphysics, the antithesis of speculative idealism: in recent physico-philosophy, the doctrine (originated and developed by A. Wilford Hall, PH.D., LL.D., of New York) that every force of nature—physical, vital, mental, and spiritual—is a real, substantial, though immaterial entity. The discussion has been mostly physical, as it starts with and rests on the phenomena of light, heat, and sound, particularly. Here, the doctrine antagonizes the vibratory or undulatory theory, which gives only matter with a propagated mechanical action. Dr. Hall at first adopted the old term 'corpuscular' for his theory, but afterward rejected it because it implies an emission of particles, which is no part of his philosophy. He regards all the forms of force as manifestations of one pervading force-substance, drawn from one reservoir. The luminiferous ether, with its vibrations, is rejected. Sound was his first stumbling-block, but is now seemingly so much in his favor that he has made converts of acousticians, such as C. W. Pearce, MUS.DOC., Cant., and George Ashdown Audsley, both of England. At first thought, nothing would seem to be clearer than that sound, when propagated by the air, is a succession of waves in the form of rarefactions and condensations in every direction, the vibrations being repeated by the drum-membrane of the ear. At first, Dr. Hall granted incidental air-waves; but he now considers them of no account, if existing even for a single foot from the most powerful sounding body: he attributes all to an immaterial sound-force (needing, however, a material conducting medium in order to travel, as shown by a bell in an exhausted receiver), making a string, a diaphragm, or a flame to move at a distance from the sounding instrument, when the 'vibrational number or tensional capacity' of the object and the instrument sufficiently agree. Mechanical vibration or tremor in that which occasions sound is simply the means by which the sound-force is liberated. 'While the quantity or loudness of sound-force thus liberated depends generally upon the amplitude of vibration of the sounding instrument, it depends much more upon the sonorous nature or quality of the sounding body itself. It never in any degree, however, depends upon the amount of atmospheric disturbance which the sounding instrument incidentally generates, nor upon the air-waves which it sends off in the form of supposed condensations and rarefactions. This is the great and fundamental error in present acoustical science. The vibrating fork, for example, can produce no possible effect upon the free air, in the shape of condensed pulses, even an inch from the vibrating prong.' Its own swiftest motion counted by inches is small. The vast disparity between the generally credited cause and the frequent result is not explained on the old theory. 'A tuning-fork, whose sound is scarcely audible unless in close proximity to the ear, if heavily struck against a pad, and held at the open mouth of a tube

whose air-chamber is of the same vibrational number, will by synchronism of its sound-pulses sympathetically throw the air-column into vibration; which, in turn, at once liberates more than one hundred thousand times as much sound-force as was produced by the fork alone, as can mathematically be demonstrated, estimating the cubical space which the two sounds will fill' (the *Microcosm*, 1889, Dec.). About 1890 Dr. Hall began to use as a weapon the law of inverse squares of distance. The phenomena of sound (excluding the mental side of the subject, which has no more to do with one physical theory than another) are a crucial test, as well as good illustration, of the theory, for which in all its aspects, scientific and religious, see the *Microcosm* (monthly), and Dr. Hall's *Problem of Human Life*, *Text-book on Sound*; also the *Scientific Arena*, 2 vols., suspended. The bearing of the theory on immortality is obvious. If all forces are immaterial substance, spirit and life cannot be mere motions of matter, to cease at death.

SUBSTANTIATE, SUBSTANTIVE: see under SUBSTANCE.

SUBSTITUTE, n. *sŭb'stĭ-tūt* [L. *substĭtūtus*, put in place of another; *substituĕrĕ*, to put in place of another—from *sub*, under; *statŭō*, I place; *sto*, I stand: F. *substitut*, a substitute]: one put to occupy the place or position of another; one who acts for another; a deputy: V. to put in the place of another; to change; to exchange. SUB'STITUTING, imp. SUB'STITUTED, pp. SUB'STITU'TION, n. *-tū'-shŭn* [F.—L.]: act of putting one person or thing in the place of another; in *algebra*, replacement of one quantity or equivalent by another of equal value; in *chem.* (see below). SUB'STITU'TIONAL, a. *-ăl*, pertaining to substitution.—SYN. of 'substitute, v.': to barter; change; truck; commute; interchange.

SUBSTITU'TION, in Chemistry: displacing of hydrogen in an organic compound by introducing in its place a radical whether simple or compound. Originally the term S. was applied only to the process of removing hydrogen from a carbon compound and introducing in its stead a chemically equivalent weight of chlorine, bromine, or oxygen. The substitution of chlorine (Cl) is seen in the following series, in which the four equivalents of hydrogen (H_4) in the carbon compound methane (CH_4) are one by one displaced, till chlorine is substituted for them all:

CH_4	Methane.
CH_3Cl	Chloromethane or methyl chloride.
CH_2Cl_2	Dichloromethane or methylane chloride.
$CHCl_3$	Trichloromethane or chloroform.
CCl_4	Tetrachloromethane or carbon tetrachloride.

The same process is seen when chlorine is substituted for hydrogen in acetic acid:

$HC_2H_3O_2$	Acetic acid.
$HC_2H_2ClO_2$	Chloracetic acid.
$HC_2HCl_2O_2$	Dichloracetic acid.
$HC_2Cl_3O_2$	Trichloracetic acid.

Bromine acts like chlorine on carbon compounds, but iodine never forms S. compounds unless the hydriodic acid resulting from its action is removed as fast as formed: this may be effected by chlorine, by iodic acid, or by mercuric oxide. But besides these chloro-, bromo-, and iodo- substitution compounds, there are nitro-compounds produced by action of concentrated nitric acid; sulpho-compounds from action of sulphuric acid; and methylated, ethylated, propylated, etc., compounds, generally produced by use of the iodides of methyl, ethyl, propyl, etc., e.g.:

Nitro-compounds.

C_6H_6	Benzene.
$C_6H_5NO_2$	Nitrobenzene.
$C_6H_4(NO_2)_2$	Dinitrobenzene.

Sulpho-compounds.

$C_6H_5(HOSO_2)$	Benzene sulphonic acid.
$C_6H_4(HOSO_2)$	Benzene disulphonic acid.

Ethylated compounds.

NH_3	Ammonia.
$NH_2C_2H_5$	Ethylamine.
$NH(C_2H_5)_2$	Diethylamine.
$N(C_2H_5)_3$	Triethylamine.

In the following cases, sulphur is seen substituted in the place of oxygen, phosphorus in the place of nitrogen, and silicon in the place of carbon:

$CH_3.CO.OH$	Acetic acid.
$CH_3.CO.S.H$	Thiacetic acid.
$N(CH_3)_3$	Trimethylamine.
$P(CH_3)_3$	Trimethylphosphine.
$C(CH_3)_4$	Tetramethylmethane.
$Si(CH_3)_4$	Silicon tetramethide.

SUBSTRATUM, n. *sŭb-strā'tŭm* [L. *sub*, under, and *stratum*]: a layer or stratum lying under another; in *metaph.*, the permanent subject of qualities or cause of phenomena. SUBSTRA'TAL, a. *-strā'tal*, of or pertaining to a substratum.

SUBSTRUCTURE, n. *sŭb-strŭk'tūr* or *-chūr* [L. *sub*, under, and *structure*]: an under-structure or foundation. SUBSTRUC'TION, n. *-shŭn*, an under-building.

SUBSTYLE, n. *sŭb'stīl* [L. *sub*, under, and *style*]: a right line on which the style or gnomon of a dial is erected. SUBSTY'LAR, a. pertaining to a substyle.

SUBSULPHATE, n. *sŭb sŭl fāt* [L. *sub*, under, and *sulphate*]: a sulphate with an excess of the base.

SUBSULTUS, n. *sŭb-sŭl tŭs* [L. *subsilĭō*, *subsultum*, to leap, to hop—from *sub*, under; *salĭō*, I leap]: in *med.*, a twitching or convulsive motion of the tendons or arteries. SUBSUL'TORY, a. *-tŏr-i*, moving by sudden leaps or starts.

SUBTANGENT, n. *sŭb-tan'jent* [L. *sub*, under, and *tangent*]: in the *conic sections*, a straight line drawn from a tangent cutting the curve, and intercepted by a straight line drawn from the point of contact of the tangent.

SUBTENANT, n. *sŭb-tĕn'ănt* [L. *sub*, under, and *tĕnant*]: an individual who occupies land or houses rented from the first tenant.

SUBTEND, v. *sŭb-tĕnd'* [L. *sub*, under, and *tendo*, I stretch]: to extend under, or to be opposite to. SUBTEND'ING, imp. SUBTEND'ED, pp.

SUBTEPID, a. *sŭb-tĕp'ĭd* [L. *sub*, under, and *tepid*]: moderately warm.

SUBTER-, *sŭb'tĕr* [L. *subter*, below, beneath—from *sub*, under]: a prefix, signifying 'beneath' or 'under.'

SUBTERFLUENT, a. *sŭb'tĕr-flū'ĕnt* [L. *subter*, beneath; *fluens* or *fluen'tem*, flowing; *fluĕrĕ*, to flow]: flowing under or beneath.

SUBTERFUGE, n. *sŭb'tĕr-fūj* [F. *subterfuge*—from mid. L. *subterfugĭum*, a subterfuge—from L. *subterfugĕrĕ*, to flee by stealth—from *subter*, under; *fugĭō*, I flee]: an artifice employed to escape censure or the force of an argument; a shift; an evasion.—SYN.: prevarication; evasion; quirk; trick; artifice; stratagem.

SUBTERRANEAN, a. *sŭb'tĕr-rā'nĕ-ăn*, or SUB'TERRA'NEOUS, a. *-ŭs* [L. *subterrānĕus*, underground—from *sub*, under; *terra*, the earth]: lying under the surface of the earth; imbedded at some depth in the earth; concealed beneath the surface of the earth; underground. SUBTERRA'NEOUSLY, ad. *-lĭ*.

SUBTILE, a. *sŭb'tĭl* or *sŭt'l* [F. *subtil*, subtle, fine-spun—from L. *subtīlis*, fine, not thick or coarse—from *sub*, under; *tēla*, the threads that run lengthwise in the loom—from *texĕrĕ*, to weave]: thin; not dense or gross; rare delicately constructed; fine. SUB'TILELY, ad. *-lĭ*. SUB'TILENESS, n. *-nĕs*, or SUB'TILTY, n. *-tĭ*, thinness; fineness; refinement. SUB'TILIZE, v. *-īz*, to make fine, thin, or rare; to refine; to spin into niceties; to make nice distinctions. SUB'TILIZING, imp. SUB'TILIZED, pp. *-īzd* SUB'TILIZA'TION, n. *-ĭ-zā'shŭn*, the act of making anything fine or thin; over-refinement.

SUBTLE, a. *sŭt'l* [the same as SUBTILE, which see]: sly; cunning; artful; wily; insinuating; shrewd; acute; in *OE.*, deceitful; acute beyond necessity. SUBTLY, ad. *sŭt'lĭ*, slyly; artfully. SUBTLENESS, n. *sŭt'l-nĕs*, or SUBT'LETY, n. *-tĭ*, artfulness; slyness; cunning. *Note.*—The spellings *subtile* and *subtle*, in the senses of the preceding two entries, were indifferently employed by good writers of former times. The modern practice is to restrict the senses to the spellings as in the text. In the Eng. Church Service, and formerly in the works of good authors, where the spellings *subtile*, *subtilty*, etc., occur in the derived senses of 'sly, cunning, over-refining,' etc., the pronunciation is *sŭt'l* and *sŭt'l-tĭ*.

SUBTONIC, n. *sŭb-tŏn'ĭk*, or SUBSEM'ITONE [L. *sub*, under, and *tonic*, or *semitone*]: in *music*, the leading note or semitone next below the tonic; the sharp seventh.

SUBTRACT, v. *sŭb-trăkt'* [L. *subtrac'tus*, drawn away from underneath—from *sub*, under; *tractus*, drawn or dragged; *trahĕrĕ*, to draw]: to withdraw or take a part from the rest; to deduct. SUBTRACT'ING, imp. SUBTRACT'ED, pp. SUBTRACT'ER, n. *-ĕr*, one who subtracts. SUBTRAC'TION, n. *-trăk'shŭn*, art or operation of taking a part from the rest; in *arith.*, the taking a lesser number from a greater (see below). SUBTRAC'TIVE, a. *-tĭv*, tending or having power to subtract.

SUBTRACTION, in Arithmetic: one of the four fundamental arithmetical processes; the diminution of a quantity by the removal of a certain portion of it. It is the reverse of *Addition*, and determines how much of any quantity remains after a certain quantity has been taken from it. Where the digits of the number to be subtracted are greater than the corresponding digits of the number to be diminished, two methods of operation may be adopted.

(1)	(2)	(3)
7324	7 (13) (12) 4	6 (12) (12) 4
1842	(2) (9) 4 2	1 8 4 2
5182	5 4 8 2	5 4 8 2

E.g., in subtracting 1842 from 7324, the numbers are written as in form (1). A usual method is to make an addition mentally to the upper figure when necessary, and then compensate for this by an equivalent addition to the next under figure, as represented in form (2). Thus, 10 'tens' are added to 2 'tens,' to enable 4 'tens' to be subtracted, and this addition is compensated for by an equal increase of the under line by 1 'hundred,' through the change of 8 'hundreds' into 9 'hundreds.' The more simple and directly intelligible plan, shown in form (3), is to borrow a unit of the next higher degree in the upper line, care being taken to remember, in the partial subtraction immediately succeeding, that the upper digit must be considered as less by unity than it appears.

SUBTRAHEND, n. *sŭb'trā-hĕnd* [L. *subtrahendus*, requiring to be subtracted—from *sub*, under; *traho*, I draw], the sum or number to be subtracted or taken from another.

SUBTRANSLUCENT, a. *sŭb'trăns-lū'sĕnt* [L. *sub*, under, and *translucent*]: imperfectly translucent.

SUBTRANSPARENT, a. *sŭb'trăns-pā'rĕnt* [L. *sub*, under, and *transparent*]: imperfectly transparent.

SUBTRIPLE, a. *sŭb-trĭp'l* [L. *sub*, under, and *triple*]: containing a third, or one part of three. SUBTRIPLICATE, a. *sŭb-trĭp'lĭ-kāt* [*sub* and *triplicate*]: indicating the ratio of the cube roots.

SUBULATE, a. *sū'bū-lāt*, or SU'BULATED, a. [L. *sūbŭla*, an awl]: in *bot.*, shaped like an awl; narrow and tapering.

SUBUNGUAL, a. *sŭb-ŭng'gwăl* [L. *sub*, under; *unguis*, a nail]: under the nail or the claw.

SUBURB, n. *sŭb'ĕrb*, plu. SUB'URBS, *-ĕrbz* [L. *sub*, under, near; *urbs* or *urbem*, a city]: the parts of a city without the walls; the outskirts or outlying parts of a city or town; the confines. SUBURBAN, a. *sŭb-ĕr'băn*, inhabiting or being in the suburbs of a city.

SUBVENTION, n. *sŭb-vĕn'shŭn* [L. *subvenīrĕ*, *subven'tum*, to come to one's assistance—from *sub*, under; *venīrĕ*, to come]: the act of coming under; a government grant or aid; a subsidy.

SUBVERSION, n. *sŭb-vĕr'shŭn* [F. *subversion*—from L. *subversus*, turned upside down—from *sub*, under; *vertĕrĕ*, to turn]: an entire overthrow; destruction; ruin; downfall. SUBVER'SIVE, a. *-sĭv*, tending to subvert or overthrow.

SUBVERT, v. *sŭb-vĕrt'* [L. *subvertĕrĕ*, to turn upside down—from *sub*, beneath; *verto*, I turn: F. *subvertir*]: to overthrow; to ruin utterly; to destroy. SUBVERT'ING, imp. SUBVERT'ED, pp. SUBVERT'ER, n. *-ĕr*, one who subverts. SUBVERT'IBLE, a. *-ĭ-bl*, that may be subverted. —SYN. of 'subvert': to destroy; invert; extinguish; reverse; overturn; corrupt; confound.

SUBWAY, n. *sŭb'wā* [L. *sub*, under, and *way*]: an underground way. An underground railway is one kind of S.: the first of this kind was opened in London 1863. But the term S. is applied usually not to such tunnelled passages for travelling, but to roomy archways to contain sewer-pipes, water-pipes, gas-pipes, steam-heating pipes, and electric wires—avoiding the expense and interruption of traffic involved in breaking up the city streets for needed repairs of pipes and wires. One such S. in London is a central arched tunnel, opened 1861, 12 ft. wide by 6½ ft. high; with arched side-openings for house service-pipes, connected with the cellarage of the several dwellings, and with side-entrances for easy access of workmen. Another S. is under Southwark st. In this instance, the main sewer is not in the S. itself, but under it, provided with man-holes, gullies, ventilating shafts, etc. There is some difference of opinion among engineers concerning the danger from leakage and explosion when all the various sets of pipes are inclosed in the same archway.

Recently in some cities in the United States, small subways have been provided for the more dangerous electric wires that have been, and still are, suspended with other wires on unsightly poles in the streets.

SUC-, *sŭk:* a prefix, another form of SUB, which see.

SUCCADES, n. plu. *sŭk'kādz* [L. *succus*, juice]: commercial name sometimes given to green fruits and citron candied and preserved in syrup; sweetmeats.

SUCCEDANEOUS, a. *sŭk'sĕ-dā'nĕ-ŭs* [L. *succedānĕŭs*, that supplies the place of, *succēdĕrĕ*, to succeed—from *sub*, under; *cēdo*, I go]: supplying the place of something else. SUC'CEDA'NEUM, n. *-ŭm*, that which is used for something else; a substitute.

SUCCEED, v. *sŭk-sēd'* [F. *succéder*—from L. *succēdĕrĕ*, to follow after, to succeed—from *sub*, under or after; *cēdo*, I go: It. *succedere*]: to follow or come after; to take the place which another has left; to obtain the object desired; to have the desired effect; to prosper. SUCCEED'ING, imp.: ADJ. following in order; taking the place of another; having success: N. act of one who, or that which, succeeds; in *OE.* consequence; result. SUCCEED'ED, pp.

SUCCENTOR, n. *sŭk-sĕn'tĕr* [mid. L. *succentor*, an accompanier—from L. *sub*, under; *cantor*, a singer—from *cano*, I sing]: in a church choir or concert, one who sings the bass or lowest harmonized part; in cathedral churches, the precentor's deputy; in *OE.*, a prompter; an inciter.

SUCCESS, n. *sŭk-sĕs'* [F. *succès*—from L. *successus*, a happy issue, success—from *succēdo*, I succeed (see SUCCEED): It. *successo*]: a happy or favorable issue; the prosperous termination of anything attempted; issue; result. SUCCESS'FUL, a. *-fŭl*, prosperous; fortunate. SUCCESS'FULLY, ad. *-lĭ*. SUCCESS'FULNESS, n. *-nĕs*, the condition of being successful.

SUCCESSION, n. *sŭk-sĕsh'ŭn* [F. *succession*—from L. *successĭō* or *successĭōnem*, succession—from *succēdĕrĕ*, to succeed (see SUCCEED)]: series of persons or things following one another either in time or place; act of succeeding or coming in the place of another; race; lineage; act or right of taking an inheritance: in *Scotch law*, the taking of property by one person in place of another: see HEIR, in Scotch Law: HEIRS-PORTIONERS: HEIR, at Law. SUCCES'SIONAL, a. *-ăl*, denoting a regular order or succession. SUCCES'SIONALLY, ad. *-lĭ*. SUCCES'SIVE, a. *-sĕs'sĭv*, following in an uninterrupted course; coming by succession; in *OE.*, inherited by succession. SUCCES'SIVELY, ad. *-lĭ*, in uninterrupted order; one after another. SUCCES'SIVENESS, n. *-nĕs*, the state of being successive. SUCCES'SOR, n. *-sĕr*, one who succeeds to, or follows in the place of, another. APOSTOLIC SUCCESSION, uninterrupted transmission of ecclesiastical authority, by regular ordination through a succession of bishops (and through them of priests and deacons), from the apostles: claimed by the Rom. Cath., the Greek, and oriental churches; and maintained by the Anglican and the Prot. Episc. churches as historical, and in general and virtually, though not universally, maintained as essential to valid transmission of clerical orders. SUCCESSION DUTY, in *Great Britain*, a tax imposed on every succession to property, whether real or personal, according to its value and the relation of the person who succeeds.

SUCCESSION ACTS, in English History: acts of parliament on various occasions, limiting or modifying the hereditary succession to the throne. The earliest instance of such interference was in the reign of Henry IV., who possessed himself of the crown, to the exclusion of the descendants of Lionel, Duke of Clarence, second son of Edward III., and who was confirmed in his title by parliament. Parliamentary interposition was subsequently exercised in the case of Henry VII., and in regard to the immediate successors of Henry VIII. The respective rights of James I., Charles I., and Charles II. were acknowledged by parliament; and in the case of Charles II. the crown was held by parliament to have devolved on him immediately on the death of his father.

The revolution of 1688 was founded on the so-called abdication of the govt. by James II.: see ABDICATION. The convention bestowed the crown on William and Mary for life, and regulated the claims of Anne. On the impending extinction of the Prot. descendants of Charles I., the crown was settled by 12 and 13 Will. III. c. 2, in event of the death of William and Anne without issue, on the next Prot. line, according to the regular order of succession—viz., the descendants of Electress Sophia of Hanover, granddaughter of James I.; and it was at the same time enacted, that thenceforth whoever should come to possession of the crown, should join the communion of the Church of England as by law established. This is the latest parliamentary limitation of the crown; but the right of parliament to limit the succession has been secured by 6 Anne, c. 7, which attaches the penalties of treason to the 'maliciously, advisedly, and directly' maintaining, by writing or printing, that the king and parliament cannot make laws to bind the succession to the crown, and the penalties of a *Præmunire* (q.v.) to maintaining the same doctrine by preaching, teaching, or advised speaking.

SUCCESSION WARS: struggles frequent in Europe, between the middle of the 17th and the middle of the 18th c., on the occasion of the failure of a sovereign house. The most important of these wars were—that of the Orleans succession to the Palatinate (1686–97), closed by the peace of Ryswick; of the Spanish succession (1700–13); of the Polish succession (1733–38), closed by the peace of Vienna; of the Austrian succession (1740–48); and of the Bavarian succession (1777–79), called, in ridicule, the Potato-war. Of these, the second and fourth were by far the most important; and a notice of them is subjoined.

WAR OF THE SPANISH SUCCESSION. This arose on the death, without issue or collateral male heirs, of Charles II., King of Spain, 1700, Nov. 3. The nearest natural heir to the throne was of the royal line of France, Charles's elder sister having married Louis XIV.; but to prevent any possible union of the two crowns, a solemn renunciation had been exacted both from Louis and his queen, for themselves *and their heirs;* and this renunciation having been ratified by the king and cortes of Spain, was made as binding as legal forms could make it. Failing the

Bourbons, the next heirs were the descendants of the younger sister of Charles, who had married the emperor Leopold I., and from whom no renunciation had been exacted; and the only issue being a daughter, who had married the Elector of Bavaria, and borne a son, Joseph-Ferdinand, this prince was during his lifetime regarded both by Charles II. and by the Spanish people as the rightful heir. But as he died 1699 without issue, the question of succession was reopened, Louis XIV., failing his wife's rights, claiming it for himself, as the son of Philip IV.'s elder sister (being, however, again legally barred here by another solemn renunciation); while Emperor Leopold, maintaining with justice that the Bourbons were by these two renunciations wholly deprived of their rights of heirship, claimed the throne as the son of Philip IV.'s younger sister. The other powers of Europe, especially Britain, Holland, and Germany, interested themselves in the matter, as a question of policy, and with good reason; for not only was the crown of Spain a valuable prize in itself, carrying with it the sovereignty of the Netherlands, the Milanese, Naples and Sicily, and immense possessions in America, but also its union with France or Austria would endanger the independence of every other sovereignty in Europe. Both claimants bade for the support of the maritime powers—one by renouncing his claims in favor of his second grandson, Philip of Anjou; the other by putting forward his second son, Charles, as his substitute; while both solemnly promised never to undertake the union of the two crowns. The Austrian party at first preponderated in Spain; but Louis, by unscrupulous policy, undermined the Austrian influence at Madrid, and Philip was declared the heir 1700, Oct. 2. On the death of King Charles, Philip appeared in Spain, and was well received and at once recognized as monarch, an example gradually and unwillingly followed by all the European powers except the emperor; for at that time the dread of Louis XIV.'s power pressed like an incubus on Europe. However, the French monarch, by various ill-advised acts, chiefly by his support of the elder Pretender (son of James II.), whom he recognized as sovereign of Britain, and by occupation of the Netherlands and menacing treatment of Holland, stirred up such general resentment, that William III. was enabled to revive the *Grand Alliance*, and his successor, Anne, to join with Holland and Austria in declaring war against France and the 'Spanish usurper,' 1702, May 15.

Hostilities at once began: a combined British-Dutch-German army under Marlborough attacked the French in Belgium, and captured one by one their fortresses on the Maes, while the Reichs army (Germany having declared for Austria), under the Markgraf of Baden, crossed the Rhine, and took Landau. Austria had begun the contest in the previous year, by sending into Italy Prince Eugene (q.v.) of Savoy-Carignan, at the head of a veteran army of 32,000 men. Meanwhile, the Elector of Bavaria raised an army and declared for France; and a French army under

Villars joined him, but returned to France (1703). In the Low Countries, Marlborough took from the French their strongholds: in Italy, the Austrians lost heavily, but were relieved by the defection from France of the Duke of Savoy, who joined the grand alliance 1703, Oct. 25. The first great blow was struck 1704, when the combined Austrian-German-British army, under Marlborough, totally defeated the French and the Elector at Blenheim (q.v.), driving the debris of their forces almost to the foot of the Vosges. After this the French never gained permanent footing in Germany. The campaigns of Marlborough in Germany, and of Eugene in Italy, 1705, were successful but not important. In 1706 the British and Dutch had forced the French into S. Brabant, and Marlborough having, by stratagem, caused them to march toward Namur, suddenly attacked them at Ramillies (q.v.), and put them to rout with great slaughter, the elector and Villeroy, the joint commanders, narrowly escaping capture. Louis hastily reinforced his army, and recalled Vendome from Italy to take the command—a step which cleared the way for Eugene, who completely out-generalled his opponent Marsin, and after a memorable march of 34 days, appeared before Turin, and united with the Duke of Savoy. The battle of Turin, in which the gallant Marsin was slain, was one of the most obstinate of the whole war; but its result was decisive; the French power in n. Italy was shattered; and the following year saw the country completely cleared of French and Spaniards. From 1706 the war in Germany was purely defensive, and with no notable battle. In Italy the Austrian arms were mostly successful, Mantua and Naples (1708) being subdued, and the pope compelled to neutrality by dread of another sack of Rome. But since the beginning of 1704, another theatre of war had been established by the landing of the Archduke Charles at Lisbon with 8,000 British and 6,000 Dutch troops, who were joined by the Portuguese, and invaded Spain; and when the Earl of Peterborough (q.v.), with a small body of troops landed in Catalonia, the Bourbon forces, attacked from both the e. and the w., were driven across the Pyrenees. After Peterborough's departure Berwick (q.v.) made head against his antagonists, and by his victory at Almanza (1707, Apr. 25), recovered the whole of Spain except Catalonia. In 1710 Berwick finally left Spain; and the Carlists under Stanhope and Starhemberg regained power, repossessing themselves of e. Spain, and of Madrid (Sep. 28). On the arrival of Vendome, Stanhope was defeated and captured (Dec. 9) at Brihuega, and Starhemberg was forced to retreat. Meanwhile the most important struggle had been in the Netherlands, where Marlborough (1707) drew up in concert with Eugene a secret plan of operations which effected a division of the Moselle army under the elector and Berwick from that of the n. under Vendome; whereupon the British and Germans swiftly uniting fell upon Vendome's army at Oudenarde (q.v.) (1708), and defeated it severely before Berwick could come to its aid.

The capture of Lille, Ghent, and Bruges followed. France now began to show exhaustion, and made overtures of peace; but these being chiefly illusory, were rejected; and the emperor having largely reinforced Eugene, the allies took the field with 110,000 men, while the French, equal in strength, were directed by Villars, their most enterprising general; but his star fell before that of Marlborough at Malplaquet (q.v.) (1709, Sep.). The opportune death of the emperor (1711, Apr. 17) rescued France from the brink of destruction; for Britain became immediately lukewarm in support of a cause which would effect the reunion of Austria and Spain; and the tories having come into power, private preliminaries of peace were signed between Britain and France, 1711, Oct. 8. Eugene, however, continued the war, aided by Holland, and captured Quesnoy; but the defeat and capture of the Earl of Albemarle and the British contingent at Denain, 1712, July, compelled Eugene to give way; and in the following spring the Dutch joined the British as parties to the peace of Utrecht (q.v.). Emperor Charles also was forced to conclude a treaty of peace at Baden, 1714, Sep. 7, which ended the struggle, leaving Philip in possession of the Spanish throne (see UTRECHT, PEACE OF); while Austria obtained the Spanish Netherlands and the Milanese.

WAR OF THE AUSTRIAN SUCCESSION. The death of Emperor Charles VI. (1740, Oct. 20), by which the male line of the House of Hapsburg became extinct, was the signal for a general uprising of the powers of Europe, some to prey on the Austrian possessions, others to aid the eldest daughter and heir of the deceased emperor. This contingency had long been provided for by Charles VI., for as early as 1713 he had published a *Pragmatic Sanction* (q.v.), stipulating that, in default of male heirs, the whole of his dominions should descend undivided to his eldest daughter, Maria Theresa (q.v.). This arrangement gained general consent—the Elector of Bavaria, Charles-Albert, alone refusing to resign his pretensions. Maria Theresa, on the death of her father, intimated her accession to the various European powers, and from all except France and Bavaria received assurances of good-will; but two months did not elapse till Frederick II. of Prussia, without declaration of war, invaded Silesia. The Austrian treasury was exhausted, and the army disorganized; while the alarm into which this sudden attack had thrown the court of Vienna was increased by doubts as to the intentions of France. These doubts were soon resolved by France, in the spring of 1741, forming a confederacy of all the claimants to the Austrian dominions—the electors of Bavaria and Saxony, sons-in-law of Emperor Joseph I.; Philip V. of Spain; Charles-Emmanuel of Sardinia, who claimed the Milanese; and Frederick II. of Prussia, who *now* demanded almost the whole of Silesia. On the other hand, Britain granted Maria Theresa an annual subsidy of £300,000; the Dutch were willing to aid her; and Hungary gallantly responded to her pathetic appeal by sending her motley population in thousands—Magyars, Croats, Slavs, and

Tolpatches, to defend their heroic queen. Meantime the Bavarians, with the French under Belleisle, overran Bohemia. Their invasion compelled the queen to buy off her most formidable opponent, Prussia, by surrender of Silesia and Glatz; then, while Prince Charles of Lorraine kept the French at bay in Bohemia, Khevenhuller, most enterprising of the Austrian generals, advanced up the valley of the Danube, captured 12,000 French in Lintz, overran Bavaria, and on the very day of the elector's coronation as Emperor Charles VII., took Munich his capital (1742, Feb. 12). But this great success alarmed Frederick II. for the security of his new possessions, and abruptly breaking the treaty, he poured his forces into Bohemia and Upper Austria, and gained the battle of Chotusitz (May 17). The same year witnessed the expulsion of the French and Bavarians from Bohemia; the severance of the king of Sardinia from the coalition against Austria; the enforcement of neutrality on Naples by the threatening attitude of a British fleet off the capital; and, on the other hand, the recovery of Bavaria by the elector.

1743, May, Bavaria again fell into the hands of Prince Charles and Khevenhuller; Count Saxe was driven from the Palatinate; 'Emperor' Charles-Albert and the Swedes, disgusted at their ill-success, retired from the contest, so that France and Spain remained sole representatives of the once mighty coalition. In 1744 France and Britain, hitherto engaged in the conflict only as allies, declared war on each other; and Britain destroyed piecemeal the French and Spanish shipping on the high seas, and attacked their colonial possessions. For this, however, the successes of Saxe in the Netherlands were a compensation. But the great successes of Austria on the Rhine, and the ambitious projects of Maria Theresa, again alarmed Frederick II. for Silesia; and he concluded at Frankfurt 1744, May 13, a secret convention with France, the emperor, the elector-palatine, and the king of Sweden. Bursting into Bohemia, Frederick II. forced the Austrians to return from Alsace, thus enabling the elector to recapture Bavaria; but before Prince Charles had time to reach Bohemia, a fresh levy of 44,000 chivalrous and patriotic Hungarians, joined by 6,000 Saxons, had reached the Prussians, cut off their supplies, and compelled them to evacuate the kingdom. In Italy the Spaniards, joined by the Neapolitans, were defeated, and compelled to retreat down the peninsula; and the king of Sardinia prevented the French from effecting permanent lodgment in n.w. Italy. 1745, Jan., the emperor-elector died, and his son, Maximilian-Joseph, profiting from his father's misfortunes, declined to take part in the contest, or to allow himself to be nominated emperor, and made peace with Austria. Frederick II., displeased with the overbearing conduct of France respecting the approaching imperial election, also sought terms with Austria by the mediation of Britain; and the peace of Dresden, 1745, Dec. 25, withdrew Prussia from the conflict. In Flanders, after the victory of Fontenoy, 1745, May 11, Saxe captured the chief Belgian fortresses. In Italy, the

Spanish-Neapolitan army, reinforced by the Genoese and Modenese—70,000 men in all—overran Lombardy and much of the Sardinian territories. Similar reverses befel the allies in Flanders 1746; but these were more than counterbalanced by the great successes in Italy, where the lost fortresses were recaptured, the coalition army routed in a great battle near Placentia (June 16), and Genoa occupied. A favorable event to Austria was the death of Philip V. of Spain (July 9), which, by depriving that arch-plotter, his queen, of the supreme power, diminished the zeal of the Spanish court in the contest. In 1747 the Dutch felt the ravages of the war: Saxe, having subdued the Austrian Netherlands, overran Dutch Flanders, and routed the unfortunate Duke of Cumberland at Laffeldt (July 2), while his chief of engineers, Count Lowendal, after two months' siege, took Bergen-op-Zoom, Cohorn's masterpiece, a fortress believed by the Dutch to be impregnable. Early in 1748, Britain, France, and Holland sought a peace, and agreed to preliminaries, which were submitted to Austria and Sardinia. Austria at first refused them; but after her two allies, in disgust of her disregard of their sacrifices, had signed them (Apr. 30), Austria sullenly followed (May 18). Much discussion followed; but 1748, Oct. 18, the treaty of Aix-la-Chapelle (q.v.) ended this most disastrous war, which left the Hapsburgs in possession of their hereditary dominions except Silesia and some of their Italian provinces. See AIX-LA-CHAPELLE.

SUCCINATE, n. *sŭk'sĭ-nāt* [L. *succĭnum*, amber]: a compound of succinic acid with a base. SUC'CINATED, a. combined with succinic acid or with amber. SUCCINITE, n. *sŭk'sĭ-nīt*, an amber-colored variety of lime-garnet. SUC'CINOUS, a. *-nŭs*, pert. to or resembling amber. SUCCINIC ACID ($C_4H_6O_4$), a dibasic organic acid, one of the products of destructive distillation of amber, also from wormwood leaves, etc.; named from its having been originally found in amber. It is one of the group of dibasic acids of the oxalic acid series, whose general formula is $C_nH_{2n}(CH_2OH_2)$, the C_nH_{2n} representing a diad hydrocarbon radical. When pure it is white and crystalline. Succinic acid occurs as a natural constituent not only in amber, but also in resins of many of the pine tribe, in leaves of the lettuce and wormwood; and, in the animal kingdom, it has been detected in the fluids of hydatid cysts and hydrocele, in the parenchymatous juices of the thymus gland of the calf and of the pancreas and thyroid gland of the ox. An important point concerning it is its convertibility into tartaric acid, while tartaric acid may in turn be reconverted into succinic acid.

SUCCINCT, a. *sŭk-sĭngkt'* [F. *succinct*, concise—from L. *succinctus*, prepared, short—from *sub*, under; *cinctus*, girded; *cingĕrĕ*, to gird: It. *succinto*]: shortened; compressed into a narrow compass; brief; concise; in *OE.*, tucked or girded up; having the clothes drawn up slightly from about the legs. SUCCINCT'LY, ad. *-lĭ*, briefly; concisely. SUCCINCT'NESS, n. *-nĕs*, brevity; conciseness.—SYN. of 'succinct': brief; short; summary; compendious; terse.

SUCCISE, a. *sŭk-sīs'*, or SUCCISUS, a. *sŭk-sī'sŭs* [L. *succīsus*, lopped off; *succīdo*, I lop off—from *sub*, under; *cædo*, I cut]: in *bot.*, appearing as if a part were cut off at the extremity; premorse,

SUCCOR, or SUCCOUR, v. *sŭk'kĕr* [L. *succur'rĕrĕ*, to hasten to the aid or assistance of a person—from *sub*, under; *curro*, I run: F. *secourir;* It. *soccorrere*, to succor]: to help when in want or distress; to assist; to aid; to relieve; to be a remedy to or for: N. help; aid; assistance; assistance that relieves from want or distress; the person or thing that brings relief. SUC'CORING, imp. SUC'CORED, pp. *-kĕrd*. SUC'CORER, n. *-ĕr*, a helper. SUC'CORLESS, a. *-lĕs*, destitute of help or relief.—SYN. of 'succor, v.': to help; deliver; cherish; comfort.

SUCCORY, n. *sŭk'kĕr-i* [corrupted from CHICORY, which see]: chicory or wild endive: see CHICORY.

SUCCOTH, or SUKKOTH, *sŭk'oth* [Heb., booths]: ancient town of the Holy Land, of uncertain location, but identified by some with ruins e. of Jordan, near the junction of the Wady Zerka (Jabbok) with that river. The first mention of it is after the meeting of Jacob and Esau (Gen. xxxiii.), Jacob journeying to the place and building booths for his cattle—whence the name. In the time of the judges (Judges viii.), Succoth had princes and 77 elders, whom Gideon beat with thorns, because they refused him bread when he was pursuing the Midianites.—Another Succoth (Gen. xiii. 20) was the first camping-place of the Israelites in their flight from Egypt, and is supposed to have been about 15 m. e. of Rameses.—*Succoth-benoth* (II Kings xvii. 30) was the name of a Babylonian god, set up in Samaria; but it appears to have had no connection with the place Succoth.

SUCCULENT, a. *sŭk'kū-lĕnt* [F. *succulent*—from mid. L. *succulen'tus*, juicy—from L. *succus*, juice, sap]: full of juice—applied to plants that have juicy and soft stems or leaves; soft and juicy. SUC'CULENTLY, ad. *-lĭ*. SUC'CULENCE, n. *-lĕns*, or SUC'CULENCY, n. *-lĕn-sĭ*, juiciness. SUCCULENT PLANTS, plants remarkable for the thick and fleshy or juicy character of their stems and leaves. This character prevails in the nat. orders *Cactaceæ*, *Mesembryaceæ*, and *Crassulaceæ*, but appears frequently also in genera of other nat. orders, e.g., aloes and some other *Liliaceæ*. It consists in a peculiar development of cellular tissue. Succulent plants are notable for the small number of Stomata (q.v.) on the green surface. They are generally found in dry climates, often as almost the only vegetation of the most arid places; though some of them occur in situations where moisture is often abundant. Thus, there are not only succulent plants in the Sahara and other deserts, but some of them are conspicuous in the flora of the mountains of Europe—e.g., species of *Sedum*, *Rhodiola rosea*, etc.—growing on bare rocks, steep slopes with scanty soil, and the like. The lack of stomata and the store of moisture in their own cellular tissue adapt them to endure long droughts. Yet they live in great part by

nourishment from the atmosphere, rather than from the soil; as is seen in the flourishing growth of the Common Yellow Stonecrop (*Sedum acre*) suspended by a string. In dry tropical countries, succulent plants perform in part the office of lichens and mosses in colder regions, in preparing the first mold for vegetation.

SUCCUMB, v. *sŭk-kŭm'* [L. *succum'bĕrĕ*, to lie down beneath, to submit to—from *sub*, under; *cumbo*, I lie]: to sink under, as trouble; to submit; to yield. SUCCUMB'ING, imp. SUCCUMBED', pp. *-kŭmd'*.

SUCCURSAL, a. *sŭk-kŭr'săl* [L. *succur'sus*, aided, assisted; *succur'rĕrĕ*, to aid—from *sub*, under; *curro*, I run]: associated and tributary; additional and aiding.

SUCCUS, n. *sŭk'ŭs*, n. plu. SUCCI, *sŭk'sī* [L., juice]: in *pharm.*, expressed juice of a plant intended to be used medicinally.

SUCCUSSION, n. *sŭk-kŭsh'ŭn* [L. *succussus*, a shaking, a jolting—from *sub*, under; *quatiō*, I shake]: the act of shaking; a shake; in *med.*, an ague.

SUCH, a. *sŭch* [a corruption of So and LIKE, which see: Goth. *svaleiks*, so like: AS. *swylc;* OHG. *solich;* Ger. *solch*, such]: of that kind; the same that; like what has been said; referring to time, place, etc., already mentioned; very great; considerable. SUCH LIKE, similar; of a like kind; so forth. SUCH AND SUCH, referring to a person or place of a certain kind.

SUCHET, *sü-shā'*, LOUIS-GABRIEL, Duke of Albufera, Marshal of France: 1770, Mar. 2—1826, Jan. 3; b. Lyon; of honorable family. He volunteered as a private in the cavalry of the Lyon national guard 1792, and afterward was attached to the army of Italy. His rare intelligence and brilliant valor, at Lodi, Rivoli, Castiglione, Arcola, and other battles, gave him military reputation, and 1798 he became gen. of brigade. He performed one of the most brilliant military feats on record when, with a force not one-sixth of that of the Austrians, he kept Melas in check (1800), preventing the invasion of s. France, and ultimately capturing 15,000 prisoners. In 1799 he was made gen. of division under Joubert in Italy; in 1800 second in command under Masséna. S. took distinguished part in the campaigns against Austria (1805) and Prussia (1806), and was subsequently (1809) appointed generalissimo of the French army in Aragon, where first he appears in independent command. The most obstinately patriotic district in Spain was completely subdued, more, however, through his just and able administration and strict discipline than by military prowess. He had need of prowess against only the Spanish troops, and these he had little difficulty in annihilating. In the first few days of 1812 he conquered Valencia, and then obtained in addition to his dignity of marshal (1811) that of Duke of Albufera, and the grant of a magnificent domain. His five campaigns in the Peninsula are models of the kind of service that he had to perform—viz., to rivet the chains of a foreign domination on a patriotic and spirited people,

For details, see his *Mémoires sur ses Campagnes en Espagne* (Paris 1829,34, 2 vols. with atlas). But the disasters of the other French armies in Spain compelled S. gradually to relinquish all his conquests. He was created a peer by Louis XVIII., but took service under his old master after his return from Elba, and was charged with the defense of the s.w. frontier. Deprived of his peerage at the second restoration, he did not return to court till 1819, when it was restored, and he soon rose high in royal favor. He died at the chateau of Saint-Joseph, near Marseille. Napoleon's high opinion of S.'s military talents is recorded by O'Meara and Las Casas—ranking S. second, Masséna being first.—His son and successor in the dukedom of Albufera was a member of the corps législatif and a supporter of the Napoleonist policy under Napoleon III.

SU-CHOW, *sô-chow':* city in the province of Kiang-su, China; on the great imperial canal; 55 m. w.n.w. of Shanghai. It was founded A.D. 484, is one of the most substantially built cities in the world, and was formerly one of the largest. It is intersected by numerous canals; contains a marvellous 9-storied pagoda; and is a great commercial and manufacturing centre. Pop. 500,000.

SUCK, v. *sŭk* [Ger. *saugen;* Dan. *suge;* Sw. *suga;* W. *sugno*, to suck: Gael. *sùg*, to suck; *sùgh*, juice: L. *sugĕrĕ*, to suck]: to draw from the teat of a female with the mouth; to draw with the mouth; to draw into the mouth, as milk; to imbibe; to draw or drain; to draw in; to inhale: N. the act of drawing with the mouth; milk drawn from the breast with the mouth by an infant. SUCK'ING, imp.: N. the act of drawing from, as with the mouth. SUCKED, pp. *sŭkt.* SUCK'ER, n. *-ér*, he who or that which sucks; a round piece of leather used by boys to lift stones with; the piston of a pump; the shoot of a plant from the root, or near to it. SUCKET, n. *sŭk'ĕt*, a sweetmeat. SUCKING-BOTTLE, a bottle filled with milk, having a tube, used for infants as a substitute for the breast. SUCKING-FISH, a fish of the genus *Remŏrā*, which bears a sucker-like organ. SUCKLE, v. *sŭk'l*, to give suck to; to nurse at the breast. SUCK'LING, imp. *-lĭng:* N. a young child or animal brought up by the mother's milk; an infant. SUCKLED, pp. *sŭk'ld.*

SUCK'ING-FISH: name sometimes given to the Remora (q.v.), and to fishes of the family Discoboli (q.v.), which have a sucker formed by union of the ventral fins, and are capable of attaching themselves by it to stones or other substances. One of the best known species, the only one of value as food, is the Lumpsucker (q.v.). Several other species are popularly named SUCKER—e.g., the CORNISH SUCKER (*Lepidogaster Cornubiensis*) and the UNCTUOUS SUCKER or Sea-snail (*Liparis vulgaris*).

SUCKLING, *sŭk'lĭng*, Sir JOHN: one of the brilliant cavalier poets of the court of Charles I.: 1609—about 1642; b. Whitton, in Middlesex. His father, also a knight, held office as sec. of state, and comptroller of the household. S. in his 18th year, at his father's death, inherited large estates; completed his education at Trinity College, Cambridge; went

abroad, and served in Germany under Gustavus Adolphus. He returned about 1632, and was soon distinguished for his wit, gallantry, and lavish expenditure. To aid Charles I. against the Scots, he raised a troop of 100 horsemen, whom he clad in a rich and gaudy uniform of white and red, with red plumes in their caps: this corps is said to have cost the poet about £12,000. They rode north; but no sooner had the cavalry come within sight of the Scots army at Dunse, than they turned and fled without aiming a blow. This disgrace gave occasion to numerous lampoons, and to a clever though coarse ballad against S.'s gay horsemen, who in reality had behaved no worse than the rest of the English army. Their loyal commander, being discovered in a scheme to rescue Strafford from the Tower and to bring in French aid against the parliament, was charged with high treason, and fled to the continent. Of the varying accounts of his death while yet young, the most painful—that he poisoned himself in Paris—is confirmed by family tradition. See the Memoir by the Rev. Alfred Suckling (1836), prefixed to *Selections from the Works of Sir John Suckling.* He had probably run through his fortune, and dreaded want, as well as despaired of the success of the royal arms.—The works of S. comprise four plays, now forgotten; a prose treatise, *An Account of Religion by Reason;* a collection of *Letters*, stiff and artificial, and miscellaneous poems, beginning with *A Session of the Poets* (1637), original in style, and happily descriptive of the author's contemporaries. But the fame of S. rests on his songs and ballads, which are inimitable for ease, gayety, wit, fancy, and exquisite felicity of poetic diction.

SUCRE, *sō'krā* [named from Antonio José de *Sucre* (q.v.)]: monetary unit of Ecuador: the gold S. has the value of 77·1 cents in U. S. gold coin.

SU'CRE: see CHUQUISACA.

SU'CRE, ANTONIO JOSÉ DE: soldier: 1793, Feb. 3—1830, June 4; b. Cumana, Venezuela. On graduating 1810, at the Coll. of Milit. Engineers, Caracas, he joined the patriot army, and served as staff-officer with Gen. Miranda, Gen. Mariño, and Gen. Bolivar, who called S. 'the soul of the army' because of his genius for organization. Sent into Peru in command of a liberating force, he won the victory of Pichincha, which freed Ecuador from the Spanish domination, 1822, May 24. In the decisive engagement on the plain of Ayacucho, 1824, Dec. 9, S. at the head of a force of 5,800 men utterly routed the Spanish army of 9,300 men commanded by the viceroy of Peru, La Serna; thus ended the power of Spain in Peru. Upper Peru having been declared an independent republic under the name of Bolivia, S. was elected its pres. for life, 1826, May 25, but accepted only a term of two years, and resigned the office 1828. He then retired to Guayaquil, and was made commander-in-chief of the Colombian army of defense against an invasion from Peru: he inflicted a severe defeat on the invaders 1829, Feb. 26. He was assassinated while returning to Guayaquil from the Colombian congress at Bogota.

SUCROSE, n. *sū'krōs* [F. *sucre*, sugar (see SUGAR)]: cane-sugar, as distinguished from *grape-sugar* or *glucose:* see SUGAR.

SUCTION, n. *sŭk'shŭn* [OF. *suction*, suction—from L. *suctus*, sucked; *sugĕrĕ*, to suck]: act of drawing into the mouth or into a pipe, which is effected by removing the pressure of the air. SUCTORIAL, a. *sŭk-tō'rĭ-ăl*, fitted for sucking. SUCTORIAN, n. *-rĭ-ăn*, one of a class of fishes having a mouth adapted for suction.

SUCTORIA, *sŭk-tō'rĭ-a:* name that has designated one or another order or division of several sub-kingdoms of animals, all characterized by mouth adapted to sucking: such as marsipobranchs among fishes, fleas among insects, leeches and flat-worms among worms, certain degraded parasitic forms (e.g., *Lernæa*) among crustaceans, and tentacled infusorians among protozoa.

SUDAMINA, n. plu. *sū-dăm'ĭ-nă* [*sūdo*, I perspire], or MILIARY ERUPTION: one of the vesicular diseases of the skin. The first name indicates that the disorder is always accompanied with profuse sweating; the last name refers to the small size of the vesicles, which do not exceed those of a millet-seed. The vesicles are most abundant on the neck and trunk, and are sometimes attended with itching. They almost always occur in association with febrile disorders, which, however, do not seem in any way modified by them. The only known condition that favors their production is copious and prolonged sweating. They sometimes appear in health during the summer heat, when strong exercise has induced copious sweating. Pathologically, this disease is of little importance; but is sometimes useful as a sign in diagnosis, especially in typhus and typhoid fevers.

SUDAN, or SOUDAN, *sô-dân':* Arabic equivalent of Negro-land or Nigritia; a term applied to African areas of indefinite extent. In its widest sense, it denotes the enormous zone of more or less fertile land stretching from the Atlantic to the Red Sea and the Abyssinian highlands, and from the Sahara and Egypt proper in the n. to the Gulf of Guinea, the central equatorial regions, and the Albert and Victoria Nyanzas. This is actually the home of the true negro race, though there are various elements in the population. The S. in this sense falls naturally into three great divisions: (1) *Western S.*, comprising the basins of the Senegal, the Niger, the Benuwe, and other rivers draining to the Atlantic (see SENEGAMBIA: NIGER: ETC.); (2) *Central S.*, including the basins of the Shari and other rivers running into Lake Tchad, and covering the countries of Bornu (q.v.), Begharmi (q.v.), Kanem, Wadai; (3) *Eastern S.*, the rest of the S. area e. of Wadai, mainly the basin of the Middle and Upper Nile—a portion of the S. which, having been gradually conquered by Egypt, is frequently styled also the *Egyptian Sudan.*

Until 1882 the Egyptian S. formed one ill-organized province, with its cap. at Khartoum, at the junction of the White and Blue Nile. Subsequently it was subdivided

into four sections: (1) *West*, including Darfur (q.v.), Kordofan (q.v.), Bahr-el-Ghazal (the province on a w. tributary of the White Nile, s. of Kordofan), and Dongola (q.v.), the cap. being Fasher in Darfur; (2) *Central S.*, comprising Khartoum (q.v.), Sennaar (q.v.), Berber, Fashoda (s.e. of Kordofan), and the equatorial province stretching along the Upper Nile to the great lakes—cap. Khartoum; (3) *East S.*, along the Red Sea, including Taka, Suakin, and Massowah (q.v.); (4) *Harar* (q.v.), e. of Abyssinia and n. of the Somali country, nearly separated from the rest of the Egyptian possessions, and divided into Zeyla, Berbera, and Harar. The formerly Egyptian S. must have had an area of 2,500,000 sq. m., and pop. 12,000,000. Of the inhabitants, probably three fourths are of pure or mixed negro descent, the rest of various Semitic and Hamitic elements. The former are mostly pagans or nominal Mohammedans; the latter are fanatical Mohammedans. The so-called 'Arabs' of this region, though some have a small share of Arab blood, are of very various tribes. For the ethnology of one large and important section of this domain, see NUBIA.—See also, NILE.

Political events have of late concentrated attention on the Egyptian S.; especially the insurrection of the w. portion under the fanatical Mohammedan mahdi, the resolution of the Egyptian govt. (under English influence) to abandon the whole S. except the strip along the Red Sea coast, and the mission of Col. Gordon to Khartoum. See EGYPT; GORDON, CHARLES GEORGE. For eleven years after the capture of Khartoum by the mahdi and the death of Gen. Gordon (1885) the Egyptian S. was abandoned. In 1896, however, the increasing power of the dervishes, and the defeat of the Italians in Abyssinia (1896, March), led the British govt. to determine on a demonstration in force from Wadi Halfa into the S. By agreements with Germany and Italy the sphere of British influence extends over Darfur and the greater part of the equatorial province, but France has not acknowledged this and in 1895 organized expeditions in the French Congo and S. whose object was to advance into the Nile valley. This action called forth a declaration by the British govt. that such expeditions would be considered as unfriendly acts, and here the matter rested; but on application being made to the governor of the 'caisse de la dette' for £500,000 from the reserve fund toward the expenses for carrying on the expedition (1896, March) the representatives of France and Russia objected. They, however, were overruled by the representatives of the other powers. In June several attempts, attributed to France and Russia, to prohibit the advancing of funds for the expedition were disclosed when a mixed tribunal published its decision declaring the advance illegal and condemned the British govt. to repay the various sums advanced. In spite of this opposition the Anglo-Egyptian expedition set out under the sirdar, Sir Herbert Kitchener (1896, March). Without opposition it occupied Akasheh, and this movement led Osman Digna, chief of the dervishes, to retire from Kassala (Apr. 10),

where he was threatening the Italians. In May the sirdar advanced on Ferkeh, there defeated the dervishes, capturing several emirs, then pushed on to Suarda. A cholera epidemic delayed the troops during June and July, but on Aug. 26 the expedition, now accompanied by several gunboats, moved toward Absarat. Here heavy storms, which destroyed a newly built railroad, impeded the general advance, but Dulgo was reached Sep. 13th, Fereig 14th, Barji 17th, and Kerman 19th. At Kerman the dervishes were posted in force, but retired across the river to Hafir as the expedition advanced. Hafir was shelled by the gunboats and artillery; the enemy were driven out and their only steamer captured. Pressing forward with cavalry and gunboats, the expedition occupied Dongola on the 23d after slight resistance. Soon after Korti and El Debbeh, Meraur and Handak, on the road to the south, were fortified to make the occupation of the province of Dongola secure. In 1898 the victory of the Anglo-Egyptian army was complete. Since 1899, Jan. 19, the S. has been ruled by a governor general appointed by Egypt with the assent of Gt. Britain.

SUDATORY, n. *sū'dă-tĕr-ĭ* [L. *sudatōrĭum*, a sweating-bath—from *sudārĕ*, to sweat]: a sweating room or bath: ADJ. sweating. SUDATOR'IUM, n. *-tōr'ĭ-ŭm*, a hot-air bath for promoting perspiration.

SUDBURY, *sŭd'bĕr-ĭ:* municipal borough of Suffolk, England, 19 m. s. of Bury St. Edmunds, 58 m. n.e. of London; on the left bank of the Stour, across which a bridge connects the town with the suburb of Ballingdon in Essex. There are manufactures of silk, bunting, bricks, and malt. Pop. (1871) 6,908; (1881) 6,584 ; (1891) 7,059.

SUDDEN, a. *sŭd'dn* [F. *soudain*, sudden—from L. *subĭtānĕus*—from *subĭtus*, sudden]: happening without notice or warning; unlooked-for; rash; hasty: AD. in *OE.*, in haste; suddenly. SUD'DENLY, ad. *-lĭ*, unexpectedly; without premeditation. SUD'DENNESS, n. *-nĕs*, the state of being sudden; unexpected presence. ON or OF A SUDDEN, sooner than expected; unexpectedly.—SYN. of 'sudden': unexpected; unusual; abrupt; unlooked-for; unanticipated.

SUDDEN DEATH: occurring from either natural or violent causes. It may occur naturally from syncope (fainting or swooning), from asphyxia (literally pulselessness), more correctly apnæa (privation of breath), or from coma (insensibility). See DEATH.—Syncope, or sudden cessation of the heart's action, may occur in two ways: (1) By the heart losing its irritability (or becoming paralyzed), so that it ceases to contract; (2) By the heart being affected with tonic spasm, in which it remains rigidly contracted, losing its usual alternation of relaxation. Sudden death from asphyxia, more correctly apnæa, occurs when from any cause the entrance of air into the lungs is prevented: it is not so often a result of disease as of accident. It is caused sometimes by a spasmodic closure of the chink of the glottis (see LARYNX). Sudden death from coma is liable to occur in apoplexy and injuries of the head.

Suddenness of death is not in itself indicative of poison. Natural death may occur suddenly as well as slowly; conversely, death may supervene slowly, and yet be the result of poison. Apoplexy or disease of the heart may prove fatal either instantly or within an hour: very few poisons operate with such fatal rapidity.

SUDETENGEBIRGE, *sō'dĕh-tĕn-gĕh-bĭrĕh'ĕh:* the most important mountain-range of Germany; dividing Prussian Silesia and Lausitz from Bohemia and Moravia, and connecting the Carpathians with the mountains of Franconia. It is not continuous except in the middle, where it is known under the names Riesengebirge (q.v.) and Isergebirge. The S. are rich in minerals, especially in the metals, iron, lead, copper, zinc, tin, cobalt, with some silver and gold. Schneekoppe (Snow-Peak) in the Riesengebirge, about 5,000 ft. high, is the culminating point.

SUDORIFIC, a. *sū'dŏr-ĭf'ĭk* [L. *sūdor*, sweat; *facĭō*, I make: F. *sudorifique*]: causing sweat: N. a medicine which causes sweat. SU'DORIF'EROUS, a. *-ĭf'ĕr-ŭs* [L. *fero*, I bear]: producing or secreting sweat. SUDORIPAROUS, a. *sū'dŏr-ĭp'ă-rŭs* [L. *parĭō*, I produce]: producing sweat or perspiration.

SUDRA, n., also spelled SOODRAH or SOODRA, *sō'drā* [Skr. *çudra:* Hind. *sudr*]: the artisan caste, or lowest of the four great castes among the Hindus; the others are: *Brahmin*, the highest or priestly caste; *Shatriya*, the second or military caste; *Vaisya*, the third or merchant caste: see CASTE.

SUDS, n. plu. *sŭdz* [Ger. *sod*, the bubbling up of boiling liquor: Dut. *zudderen*, to boil with a suppressed sound: Icel. *sod*, water in which meat has been sodden]: soapy water. TO BE IN THE SUDS, to be in difficulty or turmoil.

SUE, v. *sū* [OE. *seuve;* OF. *sewir;* Sp. *seguir*, to follow, to pursue at law—from L. *sequi*, to follow]: to seek justice or right by legal process; to seek for in law; to petition; to entreat; to apply for; to seek in marriage; in *OE.*, to gain by legal procedure. SU'ING, imp. SUED, pp. *sūd.* SUABLE, a. *sū'ă-bl*, that may be sued. SU'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, liability to be sued. TO SUE OUT, to petition for and take out.

SUE, *sü*, JOSEPH MARIE EUGÈNE (generally known as EUGENE SUE): French novelist of the melodramatic style: 1804, Dec. 10—1859, Aug. 3; b. Paris. His father was one of the household physicians of Napoleon, and educated his son for his own profession. As surgeon in the army and navy, S. served in Spain 1823 and at Navarino 1828. In 1829 his father died, leaving him a fortune. He betook himself to fiction-writing, and very soon gained popularity. His earlier efforts—sea-stories somewhat after the manner of Cooper, or romances in imitation of Scott—were notably extravagant. Becoming affected with socialist ideas, he produced his two most famous works, the famous *Les Mystères de Paris*, which began to appear 1842 in the *Journal des Débats;* and *Le Juif Errant*, which appeared 1844–5 in the *Constitutionnel.* These had immense popu-

larity in France and elsewhere in Europe, and in the United States. In 1847–8 appeared *Les Sept Péchées Capitaux;* and 1852 *Les Mystères du Peuple,* his last important work: these cannot be termed edifying. At the revolution of 1848 he allied himself with the extreme republicans. 1850, Apr. 28, he was elected deputy to the legislative assembly for the dept. of the Seine, and was assiduous in his duties as such till the *coup d'état* of 1852, Dec., by which he was driven into exile. He retired to Savoy; and at Annecy he died.

In the writings of Sue much power is displayed, but not of the most healthful kind: it depends for effect too much on vicious sources of interest. He has strong command of the element of the terrible, and an undeniable energy due to his political 'purpose.' His artistic and moral faults are often obtrusive; though the latter seem almost excusable in comparison with much of French fiction that has since become popular. His literary style is of low grade. His books, even though read once with a fever-heat of curiosity, do not bear reperusal.

SUECA, *swā'kâ:* town of Spain, in Valencia, 23 m. s. of the city of Valencia; on the Jucar, about 4 m. from the Mediterranean. Brick and tile works are in operation, and there are several flour and rice mills. Pop. 13,500.

SUET, n. *sū'ĕt* [OF. *seu;* F. *suif;* It. *sevo,* tallow, fat—from L. *sēbum,* suet, grease]: solid fatty tissue, which accumulates about the kidneys and the omentum of several domestic animals, especially the ox and sheep. Beef S. is extensively used in cookery. Purified mutton S., *Sevum Præparatum* of the Pharmacopœia, is obtained by melting and straining the internal abdominal fat: it consists of a mixture of the ordinary animal fats, with great preponderance of the most solid of them, stearin, which constitutes about three-fourths of the whole. The pure S. of the Pharmacopœia is 'white, soft, smooth, almost scentless; and is fusible at 103°': it is an ingredient in cerates, plasters, and ointments. Ordinary melted S. is frequently used like lard, to preserve potted meats or fish and similar articles from action of the air. SU'ETY, a. *-ĕt-ĭ,* consisting of suet, or resembling it.

SUETONIUS, *swē-tō'nĭ-ŭs* (CAIUS S. TRANQUILLUS): Roman historical compiler and miscellaneous writer: b. prob. not long after A.D. 70; date of death unknown; son of Suetonius Lenis, tribune of the 13th legion under Otho. S. and his writings are highly praised by the Younger Pliny, who was his friend and correspondent. He was also, it is supposed, a teacher of grammar and rhetoric, and composer of exercises in pleading; and, from a letter of Pliny to him, he seems to have sometimes pleaded causes in person. Pliny procured him the dignity of milit. tribune, which, by S.'s desire, was transferred to another. Though childless, S. was (contrary to the usual Roman law), through the same friendly agency, presented by Trajan with the *jus trium liberorum.* He was afterward sec. of Emperor Adrian. All his works (among which, as we learn from Suidas, were several on topics treated usually

by grammarians) have been lost, except his *Lives of the Cæsars;* his *Lives of Eminent Grammarians,* and (in part) his *Lives of Eminent Rhetoricians.* By the first of these S. is most known, replete as it is with information—rather with anecdote and with gossip sometimes scandalous—about the Twelve Cæsars, from C. Julius to Domitian, such as are not found elsewhere. From a period long before the renaissance to the present, these 'Lives' have found numerous editors, the best of whom is still Burmann (Amsterdam 1736), and numerous translators into nearly every European language.

SUEVI, *swē'vī:* people mentioned first by Cæsar, in whose history (*De Bello Gallico*) the name is the collective designation of a great number of Germanic peoples, occupying an indefinite district on the e. side of the Rhine. They may have been the tribes subsequently known as Chatti, Longobardi, etc. Cæsar states that their territory comprised 100 cantons, and was densely wooded; that they had towns (*oppida*), but no strongholds, and that every year a part of the population left their homes to seek employment in war.—Different were the S. of whom Tacitus speaks (*Germania*, 38, etc.), who seem to have dwelt n. and e. of the S. of Cæsar, extending as far as the Elbe and the Baltic, which Tacitus calls the 'Suevic Sea.' The peoples united under the rule of Maroboduus, the Marcomannic chief, were Suevic; hence the Marcomanni and Quadi, who figure in the reigns of Marcus Aurelius and Aurelian, are often called S. After the name had fallen into disuse as a collective designation, it reappeared (second half of the 3d c., *Amm. Marc.*, etc.) as the name of a people occupying the same territory as the S. of Cæsar, who appear, however, to have been a mixed race of adventurers from different parts of Germany, and who probably took the name of S. after possessing themselves of the country. We find them in alliance with the Burgundians, Alemanni, Alani, Vandals, etc. They are among the most notable of the barbaric peoples that broke up the Roman Empire in the n.w. and w. Bursting through the passes of the Pyrenees, A.D. 409, they, with the Vandals, overran and wasted Spain (q.v.). Those who remained at home in Germany seem to have spread during the 5th c. e. to the Neckar and the Rauhe Alps, and s. as far as Switzerland: the mediæval Swabians were their direct descendants.

SUEZ, *sô-ĕz'* (*Suweis*): town of Egypt and port on the Red Sea, s. terminus of the S. Canal (q.v.), at the head of the Gulf of S. (see SUEZ, GULF OF); lat. 29° 58′ 37″ n., long. 32° 31′ 18″ e.; 76 m. e. of Cairo, with which it is connected by railway. It is walled on all sides but that toward the sea. Until the construction of the canal 1869 it was a small, ill-built, wretched looking town, with pop. about 5,000. Its old harbor was poor. The new harbor is about 2 m. s. of the town. S., though much improved in recent years, has still a mean appearance, and shows no great growth. From the 16th to the 18th c., S. had some commercial importance. It is notable now only as a station on what is called the Overland Route (q.v.) from Europe to India and the East (see RED SEA: SUEZ CANAL). Rain falls seldom, sometimes not once in three years. All around stretches a burning waste of sands. Pop. (1882) 10,913; (1890) 13,000; (1897) 24,970.

SUEZ', GULF OF: western and larger of the two branches into which the Red Sea divides toward its n. extremity. The gulf washes on the w. the coast of Egypt, on the e. that of the Sinaitic peninsula; extreme length 200 m., average breadth about 20 m. The shores are in many places low, barren, and sandy wastes; in others, bold and rocky headlands.—See RED SEA.

SUEZ', ISTHMUS OF: neck of land 72 m. wide at its narrowest part, extending from the Gulf of Suez on the s. to the Mediterranean on the n., and connecting the continents of Asia and Africa. It embraces within its limits (according to the received opinion) the fertile Goshen (q.v.) of antiquity; but it is now a wretched uninhabitable waste, of mingled sand and sandstone, interrupted here and there with salt swamps or lakes, but almost destitute of fresh water. The main interest of this region, in recent times, has been due to the fact that the isthmus is on the great route to India and China: see SUEZ CANAL.

SUEZ' CANAL: ship-canal crossing the Isthmus of Suez between the Mediterranean and the Red Sea, and separating Africa from Asia. In ancient times a canal existed connecting (indirectly) the two seas. Herodotus ascribes its projection and partial execution to Pharaoh Necho (about B.C. 600). Aristotle, Strabo, and Pliny less felicitously fix on the half-mythical Sesostris as its originator. Its completion is assigned by some to Darius, King of Persia; by others to the Ptolemies. It began about a mile and a half from Suez, and passed n.w. through a remarkable series of natural depressions to Bubastis, on the Pelusiac or e. branch of the Nile. Its length was 92 m. (of which more than 60 were cut by human labor); its width 108 to 165 ft., its depth 15 (Pliny says 30) ft. At a date unknown it became choked with sand, was restored by Trajan early in the 2d c. after Christ, but again became choked with sand, and so remained till the conquest of Egypt by Amrou, Arab gen. of the caliph Omar, who caused it to be reopened, and named it the 'Canal of the Prince of the Faithful.' After more than a century of use,

it was finally blocked up by the unconquerable sands, 767. Bonaparte during his invasion of Egypt, about 1798, caused the isthmus to be surveyed by engineers, who erroneously reported the level of the Mediterranean 30 ft. below that of the Red Sea at Suez. In 1847 France, England, and Austria sent a commission to measure accurately the levels of the two seas, and it was ascertained that the two seas have practically the same mean level, though with a tide of 6½ ft. at the southern end and 1½ ft. at the northern. A railway from Cairo to S., connecting the Red Sea with the Nile, was opened 1858 (see OVERLAND ROUTE). The French engineers clung to the project of a canal, and 1856, De Lesseps, then in the French diplomatic service in Egypt, obtained from the pasha the exclusive privilege of forming a ship-canal—not from the Nile, but directly across the isthmus to Suez (see LESSEPS, FERDINAND DE). In 1855 a new European commission reported that the scheme, somewhat modified, was practicable: the result was the formation of a joint-stock company, in which Saïd, Khedive of Egypt, took a large number of shares, and made large concessions of land; and the work was begun 1860.

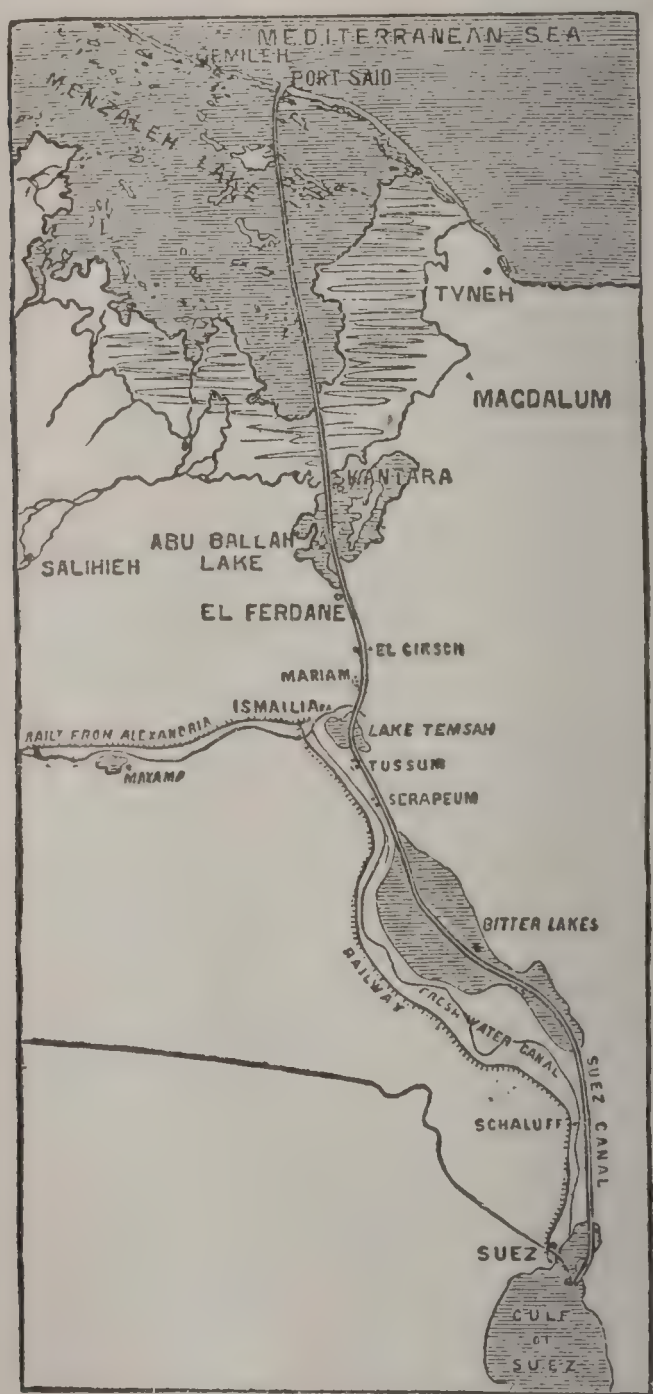
The British nation had at first little favor for De Lesseps's scheme, partly through some distrust of its engineering and financial features, but probably more from fears that the canal might divert from Great Britain the trade of the East. These fears the event has proved groundless: usually about four-fifths of all the shipping that passes through the S. C. is English. The canal was formally opened 1869, Nov. 16, with a grand procession of steamers of various countries, in the presence of the crowned heads of several nations.

Originally a French enterprise, the S. C. has passed more and more under English control. In 1875, the Brit. govt. purchased for £4,000,000 the khedive of Egypt's shares in the canal, which amounted to 176,602 out of 400,000: these shares give no returns to their owner till 1894, the khedive having alienated the dividends till that period in favor of the company. Plans for widening the canal to accommodate the greatly increasing traffic were agreed on 1886, and the works are in progress (1891).

The saving of time from Europe to India for steamers is great; but because of hinderance at the Red Sea entrance by baffling winds, sailing vessels generally still follow the ancient route. From London or Hamburg to Bombay is by the Cape about 11,220 m., but by Suez only 6,332—i.e., the voyage is shortened by 24 days. From Marseilles or Genoa there is a saving of 30 days; from Triest, of 37. The rate at which steamers are allowed to pass through, is 5 to 6 knots an hour. The canal charges are 10 francs per ton (net tonnage), and 10 francs per head for passengers. Pilotage dues were abolished 1884. The S. C. admits steamers 400 ft. long and 50 ft. beam: usual time for passage (including delays) two or three days.

Construction, Dimensions, etc.—The total length of the navigation is about 101½ m., of which about 76$\frac{1}{10}$ m. are

actual canal formed by cuttings, $16\frac{1}{7}$ m. are made by dredging through lakes; and $9\frac{1}{5}$ m. through lakes or hollows required no works. The deep channel through the lakes is marked on either side by iron beacons 250 ft. apart: this portion requires the most care in navigation to keep the vessel in the centre. The canal is intended to



Map showing Suez Canal.

have a navigable depth of 26 ft., for a width of 72 ft. on the bottom, with width at top varying from about 200 ft. to 325 ft. or more according to the character of the material through which it is cut. At one time about 30,000 laborers were employed, for many of whom dwellings had to be provided: fresh water for them was conducted through a canal from the Nile. The total cost of the S. C. and its harbors is stated at $100,000,000.

The Port Said Entrance.—Port Said or Saïd, town on the Mediterranean (pop. [1880] 12,332; [1882] 16,560), had no existence in 1860. It became the depot of the Canal Company, metropolis of the host of laborers and others employed on the works. As the Mediterranean Sea is very shallow near this point, an artificial deep channel had to be made, bounded e. and w. by piers stretching far into the sea. These piers are of artificial stone made on the spot, consisting of two parts of sand and one part of hydraulic lime ground into paste, and poured into wooden boxes or molds, and, after solidifying, hardened by exposure for months in the dry air. Each block weighed 20 tons. The w. pier has a length of about 7,000 ft., and the e. of about 6,000 ft.: they are 4,600 ft. apart at the shore, but gradually approach each other, so that their outer ends are only 2,300 ft. apart. The w. pier is continued in an arc of 3,300 ft. extent, so as, with the e. pier, to shelter the harbor from all winds. The area inclosed is about 450 acres, with average depth about 14 ft., except in the channel leading to the canal, where the depth is 25 to 28 ft. Within this outer harbor is an inner port, 2,610 ft. by 1,500, kept at a depth of 30 ft., by steam-dredging. The lighthouse is 180 ft. high.

From Port Said to Temsah Lake.—From Port Said, the canal crosses about 20 m. of Menzaleh Lake, a salt-water shallow closely resembling the lagoons of Venice, having 1 to 10 ft. depth of water: the canal through this lagoon is 336 ft. wide at the surface, 78 ft. at the bottom, 26 ft. deep. An artificial bank rises 15 ft. on each side of this channel. Beyond Menzaleh Lake, heavier works begin. The distance thence to Abu Ballah Lake is 11 m., with a height of ground above sea-level from 15 to 30 ft. After crossing this lake, there is another land distance of 11 m. to Temsah Lake, cutting through ground to a depth varying from 30 to 70 or 80 ft.; then 3 m. further across this little lake itself. At El Guisr, or Girsch, is the deepest cutting in the whole line, 85 ft. below the surface; at the water level it is 336 ft. wide, at the summit-level 519 ft., from which the vastness of the gap may be estimated. Ismailia (pop. 5 000) on Temsah Lake, is regarded as the central point of the canal.

The Fresh-water Canal.—This extends from the Nile to Temsah Lake, and was constructed to supply with water the population accumulating at various points on the line of the canal; but it is also used by small sailing-vessels. This fresh-water or 'sweet-water' canal comprises three portions or sections: (1) from the Nile e. or n.e. to Ismailia, on Temsah Lake; (2) from Ismailia nearly s. to Suez, on the w. side of the great ship or maritime canal; (3) from Ismailia nearly n. to Port Said, also on the w. side of the ship-canal. The first and second of these sections are really canals, large enough to accommodate small steamer and barge traffic; the third section consists simply of a large iron pipe, through which the water is conveyed to the several stations. Plugs are inserted in the pipe where needed, to allow water to be drawn off for every-day wants.

From Temsah Lake to Suez.—The route crosses Temsah Lake to Toussoum and the Serapeum cutting, through a plateau 46 ft. above the sea, where the waters were let in by the Prince and Princess of Wales, 1869, Feb. 28. There is a space from Temsah Lake to the Bitter Lakes, about 8 m., which had to be dug to a depth varying from 30 to 62 ft. according to the undulations of the surface. In these deep cuttings, the quantity of sand dug out (for nearly all is sand, though sometimes agglomerated with clay) was enormous. In passing through the Bitter Lakes, there was more embanking than excavating, as the bottom of this region is only 6 to 10 ft. above the intended bottom of the great canal. The tide from the Red Sea comes in as far as to the Bitter Lakes. From the s. end of the Bitter Lakes to Suez, about 13 m., is another series of heavy cuttings through the stony plateau of Chalouf, 30 to 56 ft. in depth.

Traffic, etc.—In 1870 there passed 486 vessels, tonnage 654,915, giving receipts $1,004.211; (1880) 2,026 vessels, tonnage 4,344,519, receipts $7,929,521; (1901) 3,699 vessels, tonnage 15,163,233, receipts $19,515,135. In 1893 the total expenses were less than one-half of the gross receipts.

SUF-, *sŭf:* another form of SUB, which see.

SUFFER, v. *sŭf'fĕr* [L. *sufferrĕ*, to carry under, to sustain—from *sub*, under; *ferō*, I carry: F. *souffrir*, to suffer]: to endure, support, or sustain; to feel or bear with a sense of pain or distress either in body or mind; to permit; to tolerate; to bear patiently; to feel or undergo pain; to undergo punishment; to sustain hurt or loss; to pass through; to be affected by; to be injured. SUF'FERING, imp.: ADJ. undergoing pain or loss; permitting: N. the bearing of pain or loss; pain endured; injury incurred. SUF'FERED, pp. *-fĕrd*. SUF'FERER, n. *-ĕr*, one who endures pain or loss; one who permits. SUF'FERABLE, a. *-ă-bl*, that may be endured; supportable. SUF'FERABLY, ad. *-blĭ*. SUF'FERANCE, n. *-ăns*, endurance; the bearing of pain; allowance; toleration, as in the phrase 'on *sufferance*;' permission granted by the custom-house for the shipment of certain goods; in *OE.*, patience; moderation. SUF'FERINGLY, ad. *-lĭ*.—SYN. of 'suffer': to bear; undergo; allow; permit; endure; admit;—of 'sufferance': pain; inconvenience; misery; permission; patience; moderation.

SUFFICE, v. *sŭf-fīs'* [L. *sufficĕrĕ*, to put in the place of, to be sufficient—from *sub*, under; *faciō*, I make: F. *suffire*, to satisfy]: to be equal to the wants or demands of; to satisfy; to be enough; to be equal to the end in view. SUFFI'CING, imp. SUFFICED', pp. *-fīst'*, adequately supplied. SUFFI'CIENT, a. *-fĭsh'ĕnt*, enough; equal to the end proposed; ample; adequate; qualified; fit. SUFFI'CIENTLY, ad. *-lĭ*. SUFFI'CIENCY, n. *-ĕn-sĭ*, state of being sufficient; necessary qualification; adequate substance or means; ability; supply equal to wants; self-confidence.—SYN. of 'sufficient': adequate; competent; full; satisfactory; proportionate; commensurate.

SUFFIX, n. *sŭf'fĭks* [L. *suffixus*, fastened or fixed on—from *sub*, under; *fixus*, fixed or fastened; *figo*, I fix]: a particle added to the end of a word to modify its meaning; an affix; a postfix. SUFFIX, v. *sŭf-fĭks'*, to add to the end of a word. SUFFIX'ING, imp. SUFFIXED', pp. *-fĭkst'*.

SUFFOCATE, v. *sŭf-fō-kāt* [L. *suffocātus*, pp. of *suffocārĕ*, to suffocate—from *sub*, under; *fauces*, the throat: F. *suffoquer*, to stifle]: to kill by stopping respiration; to stop breathing; to stifle; to smother. SUF'FOCATING, imp.: ADJ. choking; stifling. SUF'FOCATED, pp. SUF'FOCA'TINGLY, ad. *-li*. SUF'FOCA'TION, n. *-kā'shŭn* [F.—L.]: suspension or loss of power of respiration; act of choking or stifling; state of being choked (see ASPHYXIA: RESPIRATION). SUF'FOCATIVE, a. *-tĭv*, tending to choke or stifle.

SUFFOLK, *sŭf'ok:* maritime and most easterly county of England; bounded n. by Norfolk, s. by Essex; greatest length n. to s. about 50 m., greatest breadth e. to w. about 55 m.; 1,475 sq. m., or 944,060 acres. The surface is flat, falling away into marshes on the n.w. and s.e. borders. The coast line, low and marshy, or lined with cliffs of shingle or gravel and red loam, is about 50 m. in length; and is unbroken by any considerable indentation, and comprises no large headland except Lowestoft Ness, most easterly point in Great Britain. The chief streams are the tributaries of the Waveney, which separates S. from Norfolk on the n., and those of the Stour, which forms the s. boundary-line, together with the river Lark, affluent of the Great Ouse, and the Gipping, which, after it begins to broaden into an estuary, is called the Orwell. The climate is cold in spring, but drier than that of the w. counties. S. is one of the most fertile counties in England. The soil is of various kinds, some of which are very productive: 770,000 acres are under cultivation, and the most improved system of agriculture has been introduced, with the best and newest agricultural implements. A polled breed of cattle, of which the cows are held in high esteem, is peculiar to the county. The S. pigs, usually black in color, are a famous and most profitable breed. Branches of the Great Eastern railway intersect the county in all directions. S. has many splendid residences, and some very interesting ruins of castles and abbeys.—Pop. (1871) 348,475; (1881) 356,893; (1891) 369,351; (1901) 306,678.

SUF'FOLK PUNCH: English variety of horse, stout and round in the barrel, strongly built, with low heavy shoulders, and adapted for drawing heavy weights.

SUFFRAGE, n. *sŭf'frāj* [F. *suffrage*—from L. *suffrăgium*, right of voting: It. *suffragio*]: vote or voice in the election of a candidate for public office; the legislative franchise (see below): vote given on some controverted point; united voice of a congregation re-enforcing with their assent the minister's utterance; in *OE.*, aid; support. SUF'FRAGAN, n. *frŭ-găn*, an assistant bishop; a bishop considered in relation to his Metropolitan (q.v.): in some churches on the continent of Europe the term is applied to coadjutor bishops appointed to assist a bishop in his own

diocese: ADJ. assisting. SUFFRAGES, n. plu. *sŭf′frā-jĕz* [mid. L. *suffrāgĭum*, supplement, help, prayers to the saints for their help]: united voices of persons in public prayer; in the *Book of Common Prayer*, the prayers of the morning or evening service, which begin with the mutual salutation, the invitation, and lesser Litany; called also the *Prĕcēs*.

SUF′FRAGE, in Politics: right to vote; franchise of a voter in the election of public officials or in other public affairs.

The idea that universal political S. is a right by natural law is grounded on the fiction that the civil state or body politic arises only out of a social compact express or implied. (That the civil state, however arising, assumes the *form* of a social compact, is not denied.) In opposition to this notion of S. by natural right, it is argued that the true purpose for which government exists is the general welfare; and that it is the duty of the state to consider and decide whether the S. may be more beneficially exercised by all, by the many, or by the few. Infants, minors, idiots, and insane persons have everywhere been excluded from the S., on the ground that sound judgment is requisite to its exercise; also persons convicted of crimes have been excluded, as a security to society. Women have generally been excluded, for reasons based on their relation to society, to the family, and to the opposite sex. In all these cases, S. is withheld not as a punishment, nor as a mark of disgrace, but simply on the ground of public expediency—as when a young man 20 years and 51 weeks of age is not allowed the S., while his neighbor one week older has it. Like considerations of expediency, it is argued, are a ground for withholding the S. from those whose circumstances and station in life render it unlikely that they should form sound judgment on political questions. It is the intelligence and enlightenment of the country that an elective legislature should represent; and in any large extension of the S. there is obviously a risk of the intelligence of a constituency being swamped by its mere numerical majority. On the other hand, a widely extended S. is advocated as a valuable means of educating the people to self-dependence; and several philosophical politicians of the present day, favorable to a large extension of the electoral qualification, propose to obviate what they regard as its otherwise inevitable evils, by graduating the S. so as to give each individual elector a number of votes corresponding as much as possible to his property, education, or social position: see J. S. Mill, *Considerations on Representative Government* (1861).—In the United States, the principle of universal manhood S. (with the exceptions noted near the beginning of this article) seems firmly bedded in the laws and grounded in popular favor. Woman S. as an addition is warmly urged by an increasing though not large number.

In the United States, the right of S. does not inhere in the fact of citizenship, but is a grant from the state to a more or less restricted portion of its citizens. All the

states exclude from the S. minors, idiots, insane persons, and convicted criminals; nearly all the states exclude women, at least from full political S. In the following states, ability to write or to read or to do both is required in a voter: Mass., Miss.; in all except the following, U. S. citizenship is a prerequisite: Ala., Ark., Colo., Fla., Ind., Kan., La., Mich., Minn., Mo., Neb., N. D., Or., S. D., Tex., Wis., Wyo.: in those states, an alien who has declared intention of becoming a citizen of the United States, and who has been resident in the state for a definite period, may exercise the suffrage. In W. Va. citizenship of the state alone is required. Payment of capitation tax is a prerequisite in several states. In the following states and territories, women have a qualified right of suffrage in elections relating to public schools: Ariz., Colo., Del., Ida., Ind., Kan., Ky., Mass., Mich., Minn., Neb., N. H., N. J., N. D., Or., S. D., Tex., Vt., Wash., Wis. The laws of Ark. and Mo. give to women a voice in questions of granting liquor licenses. In Kan., women have the right of S. in all municipal elections; the same right is accorded to them in some municipalities of Del. In Utah terr., women exercised full S. from 1870 till the passage of the Edmunds law, 1882. In Wash., while it had a territorial govt., women exercised the right of S. for 5 years, but were then debarred by a judgment of the territorial supreme court. In Wyo. women have lawfully exercised S. since 1870, and that territory was admitted as a state of the Union with a provision for woman S. in its constitution. The constitution of N. J. (1776) recognized the right of S. for women, and women exercised that right till 1807.—See WOMEN'S RIGHTS.

In France, the law of universal S. for males over 21 years of age prevails; in the German empire, all males 21 years of age possess the right of S. in elections of delegates to the reichstag. In the United Kingdom of Great Britain and Ireland, the right of S. is conditioned on occupancy by the male adult citizen, as owner, tenant, or lodger, of a house, apartment, etc., worth not less than $50 a year. In Canada, the status of women as regards S. is about as in the United States: in some localities the right of municipal S. and of voting in school elections, etc., is allowed; in others, denied. In the colonies of Australasia, qualified woman S. prevails widely. In Finland, women have equal S. with men in all elections of public officers: see REFORM, PARLIAMENTARY: REPRESENTATION: BALLOT.

SUFFRUTICOSE, a. *sŭf-frō'tĭ-kōs*, or SUF'FRUTES'CENT, a. *-tĕs'sĕnt* [L. *sub*, under; *frutĭcōsus*, shrubby, bushy—from *frutex* or *frutĭcem*, a shrub]: in *bot.*, shrubby underneath; having the character of an under-shrub.

SUFFUSE, v. *sŭf-fūz'* [L. *suffūsus*, poured upon—from *sub*, under; *fūsus*, poured; *fundĕrĕ*, to pour]: to overspread with something expansible, as with a fluid, tincture, or color. SUFFU'SING, imp. SUFFUSED', pp. *-fūzd'*. SUFFU'SION, n. *-zhŭn*, the act of overspreading with a fluid or tincture; state of being suffused; that which is suffused or spread over.

SUFISM, *sō'fĭzm* [from Persian *sufi* or *sofi*, priest or monk; the Greek *sophos*, a sage; erroneously derived also from Ar. *sof* or *suf*, wool, designating an individual who wears nothing but woolen garments]: a mystic system of philosophical theology within Islam. Its devotees form a kind of ecclesiastical order somewhat similar to that of the Fakirs (q.v.) or dervishes, but they are mostly of far superior stamp; and some of the greatest Persian poets, philosophers, historians, and even kings belonged to their ranks. They assume four principal degrees of human perfection or sanctity. The first or lowest is that of the Shariat —i.e., of obedience to all the ritual laws of Mohammedanism, such as prayer, fasting, pilgrimage, almsgiving, ablutions, etc., and to the ethical precepts of honesty, love of truth, and the like: this class includes the great mass of the people. The second degree (Tarikat) is attainable not by all, but only by those higher minds that, while strictly adhering to the outward or ceremonial injunctions of religion, rise to an inward perception of the power and virtue necessary for the nearer approach to the divinity: this class (Murides) are said to fulfil the ceremonial behests not because they are behests, but because they are good in themselves. The third (Hakikal = truth) is the degree of those (Naibs) who, by continuous contemplation and devotion, have risen to the true perception of the nature of the visible and the invisible—who have recognized the Godhead, and have established an ecstatic relation to it. This state is finally sublimated into the highest and last degree (Maarifal), in which man communicates directly with the Deity: this highest degree is reached by the Murshid.—All Sufistic poetry and parlance is to be taken allegorically and symbolically. They represent the highest things by human emblems and human passions; and religion being with them identical with love, erotic terminology is chiefly used to illustrate the relation of man to God. Thus the beloved one's curls indicate the mysteries of the Deity; sensuous pleasures, chiefly intoxication, indicate the highest degree of divine love as ecstatic contemplation; while the wine-house, of which constant mention is made, merely indicates the state in consequence of which the human qualities merge in or are exalted into those of the Deity. Founded in the 9th c. by Kafi-Mullah, this peculiar mysticism has struck root principally in Persia, and chiefly among men of genius, e. g., Hafiz (q.v.). Recently it has been revived, with slight modifications, by Shamyl (q.v.), the renowned and formidable antagonist of the Russians, who undertook to enlist even the common soldiers as its votaries, though not as the initiated (for S. is an exclusive system). S. mixes all religions and their prophets indiscriminately in one class; and its votaries generally use the words idolatry, unbelief, licentiousness, and the like, in their reverse sense. Their principal writer is Jalaleddin Rumi.

SUG-, *sŭg:* another form of the prefix SUB, which see.

SUGAR, n. *shûg'ér* [F. *sucre;* Ar. *sakkar;* Skr. *sharkara,* sugar: L. *sacchârum;* Gr. *sakchâron*, sugar: comp. Gael. *sùg*, to suck; *sùgh*, juice, sap]: sweet substance obtained from the expressed juice of the sugar-cane, beet root, etc. (see below): ADJ. made of or resembling sugar: V. to season, sweeten, or cover with sugar. SUG'ARING, imp.: N. the act of covering or sweetening with sugar; the sugar thus used. SUG'ARED, pp. *-érd:* ADJ. sweetened. SUG'ARY, a. *-ér-ĭ*, sweetened with sugar; resembling or containing sugar. SUG'ARLESS, a. *-lĕs*, without sugar. SUGAR-BAKER, one who makes loaf-sugar; a sugar-refiner. SUGAR-BOILING, the art or business of a sugar-refiner. SUGAR-CANDY, or ROCK-CANDY, sugar made in the form of large crystals. SUGAR-CANE, a cane or plant from whose juice sugar is obtained (see below). SUGAR HOUSE, the place where sugar is refined. SUGAR-LOAF, a mass of refined sugar made in the form of a cone (see SUGAR, below). SUGAR-MAPLE, tree, native of N. Amer., from whose sap sugar is manufactured (see MAPLE: also SUGAR, below). SUGAR-MILL, machine for expressing the juice of the sugar-cane (see SUGAR, below). SUGAR-MITE, a small wingless insect found in moist sugar. SUGAR-PLUM, a sweetmeat in the form of a small ball. SUGAR-REFINER, one whose business is to make sugar whiter and purer. SUGAR-REFINING, the process by which raw or very brown sugar as imported is purified (see SUGAR, below). SUGAR OF LEAD, common name for acetate of lead, white like sugar, having a sweet taste, but highly poisonous: see LEAD.

SUG'AR: general name of sundry carbo-hydrates, possessing more or less sweet taste, for the most part crystallizable, and produced by the vital processes in certain plants and animals. Nearly all sugars are capable of fermentation and of being resolved, under the action of yeast, either directly or indirectly into alcohol and carbonic acid.

Cane-sugar, or *Saccharose*, or *Sucrose*, $C_{12}H_{22}O_{11}$, is the type of a genus or class of sugars—the *Saccharoses;* it is the ordinary S. of commerce, and is by far the most important of this class of compounds: in sweetening properties it exceeds grape-sugar in the ratio of 5 to 2, and milk-sugar in still higher ratio. It has specific gravity of 1·6. It dissolves in about one-third of its own weight of cold water, producing a thick viscid syrup, and in all proportions in hot water; it is slightly soluble in absolute alcohol, but spirit of wine of specific gravity 0·830 dissolves about one-fourth of its weight. By the spontaneous evaporation of its watery solution, it is deposited in four-sided rhomboidal prisms. Common loaf-sugar and sugar-candy ('rock-candy') are two well-known forms of crystallized sugar: loaf-sugar consisting of a mass of small transparent crystals, and owing its dazzling whiteness to the numerous reflections and refractions which the rays of light undergo within the interior from these numberless crystals; while the brown color which rock-candy usually possesses is due to the coloring matter not having been removed from the syrup previous to crystallization. The

crystals of rock-candy are larger than those of loaf-sugar, in consequence of the slower evaporation in the former case. When crystals of S.—e.g., two pieces of loaf-sugar—are rubbed together in the dark, a pale, phosphorescent light is evolved. If a solution of S. be boiled for a long time, it acquires an acid reaction, and loses its power of crystallizing—a change which is attended by the assimilation of additional water, and the formation of the uncrystallizable invert-sugar. This is a mixture, in equal parts, of dextrose or grape-sugar with lævulose or fruit-sugar ($C_6H_{12}O_6 + C_6H_2O_6$); it can be resolved into pure dextrose and pure lævulose by the action of slaked lime, with which is formed a solid calcium-lævulose compound, while the dextrose remains in solution in the precipitate and can be separated by pressure; the lævulose-calcium salt, when suspended in water and decomposed by carbon dioxide, is filtered and concentrated by evaporation.

The action of different degrees of heat on S. has been carefully studied. At about 320° F., saccharose fuses; and on cooling forms the transparent amber-colored solid known as *barley-sugar*, which, if kept for a long time, assumes a crystalline state, and becomes opaque. If the application of heat be continued until about 400°F., the S. loses two atoms of water, and *caramel* (see GLUCOSE) is formed; and at still higher temperature the changes which saccharose undergoes are identical with those suffered by glucose. Cane-S. is very easily oxidized. It reduces silver and mercury salts when heated with them, and precipitates gold from the chloride. Pure cupric hydrate is but slowly reduced by it even at the boiling heat; but in presence of alkali a blue solution is formed, and, on boiling the liquid, cuprous oxide is slowly precipitated. *Fehling's solution*—mixture of copper sulphate and tartaric acid, to which is added an excess of potash—is employed as a test for saccharose and for detecting the presence of glucose. Cane-S. is not *directly* fermentable; but when its dilute aqueous solution is mixed with yeast and kept warm, it is resolved into a mixture of dextrose or Glucose (q.v.) and lævulose or fruit-S., which enter into fermentation, producing alcohol and carbonic acid.

This variety of S. is obtained chiefly from the juice of the sugar-cane; but it is also abundantly present in the juices of many of the grasses, e.g., *Sorghum saccharatum*, whose juice yields 13 per cent. of S.; in the sap of maples and other forest-trees; and in the root of the beet and the mallow. Most sweet fruits contain cane-S., together with lævulose; some, e.g., walnuts, hazel-nuts, almonds, coffee-beans, and St. John's bread, contain only cane-S. Honey and the nectars of flowers contain cane-S. with lævulose; the S. in the nectary of cactuses is almost wholly cane-S.

Other sugars of the Saccharose group are: *Melitose*, obtained from the manna which falls in opaque drops from various species of *Eucalyptus; Melezitose*, found in the 'manna of Briançon,' an exudation from the young shoots of the larch (*Larix Europæa*); *Mycose* or *Trehalose*, found in many fungi associated with glucose; *Milk-S.* or *Lactose*;

and *Maltose*, produced by action of malt-extract on starch. Far the most important of these is *Lactose*, $C_{12}H_{22}O_{11}.H_2O$. It exists in considerable quantity in the milk, especially of the herbivorous animals. It may be obtained on a large scale by separating the curd from the milk, and evaporating the whey till it is ready to crystallize; when, on the introduction of small pieces of wood, the crystals of S. are deposited on them. These crystals are four-sided prisms of a milk-white color, and so hard that they crunch between the teeth. This variety of S. is only moderately sweet, requires about six times its weight of cold water for its solution, but dissolves readily in boiling water, while it is insoluble in alcohol or ether. If it be gradually heated to 284° F., two equivalents of water are expelled, whereas, if it be suddenly heated to about 400° F., all five equivalents are given off. When pure, milk-sugar is insusceptible of fermentation; but when boiled with dilute acids, it is converted into a directly fermentable S., in many respects very similar to grape-sugar. On treating a moderately diluted acid solution of milk-sugar with yeast, this variety is first formed, and then yields carbonic acid and alcohol; if, however, decomposing matters, e.g., casein in the act of disintegration, are present, it undergoes lactic and butyric fermentation; hence we understand how milk after exposure for a time to the air becomes sour. The intoxicating character of the drink prepared by the Kalmucks and Tartars from sour mares' milk is due to this indirect vinous fermentation of S. of milk: see KUMISS. Cows' milk fermented by means of yeast is also called Kumiss. Regarding the uses of milk-S., it may be observed that it is probably the most important of the constituents of whey (which is milk deprived of the whole of its casein except a mere trace held in solution), and hence that it is the active ingredient in the *whey-cure*, popular in Switzerland. (The whey in these cases is usually from goats' milk.) It is also the chief constituent of the globules used in homeopathy.

Sugars of the grape-S. class bear the general name *Glucoses:* the type of these is Grape-S., or glucose proper, called also Dextro-glucose and Dextrose. The formula for all the glucoses is $C_6H_{12}O_6$; and besides Dextrose the class comprises Lævulose or fruit-S., Mannitose, Galactose, and Arabinose. The following substances have the same chemical composition as the glucoses, $C_6H_{12}O_6$, but they are incapable of alcoholic fermentation: Inosite, a substance found in the muscular substance of the heart and other organs of animals, also in the kidney-bean and in certain other plants; Sorbin, in mountain ash berries; Eucalyn, separated in the fermentation of melitose, the sugar of certain species of *Eucalyptus;* and Dambose, obtained by heating, with hydriodic acid, *dambonite*, a peculiar kind of caoutchouc. For Grape-S., see GLUCOSE. Lævulose or fruit-S. is so called because it turns the plane of polarization to the *left* (*lævus*), while *Dextrose* or grape-S. turns it to the *right* (*dexter*). All sugars in solution have the effect of rotating a ray of plane-polarized light, passed through them, to the right (dextro-rotation) or to the left (lævo-

rotation). All sugars exert dextro-rotation except Lævulose and Invert-S. Lævulose occurs, together with dextrose, in honey, in many fruits, and in other saccharine substances: the mixture of the two is Invert-S. Lævulose is a colorless uncrystallizable syrup, more soluble in alcohol than dextrose. Cane-S. may be inverted, i.e., transformed into the mixture known as Invert-S., by warming with dilute acids or water, thus:

$$C_{12}H_{22}O_{11} + H_2O = C_6H_{12}O_6 + C_6H_{12}O_6.$$

Among the various chemical purposes to which the phenomenon of rotatory polarization may be applied is its use in determining the quantity of any kind of S. in solution. While some sugars give a right-handed rotation, others give a left-handed rotation, and each S. exerts a definite amount of rotatory power. The following are the rotatory powers of the chief varieties of S., equal weights of each being dissolved in an equal bulk of water, and the temperature being 56° :

Saccharoses ($C_{12}H_{22}O_{11}$):			*Glucoses* ($C_6H_{12}O_6$):		
Cane-sugar, . . .	right	73°	Grape-sugar, . . .	right	57°
Trehalose, ...	"	200°	Lævulose, ...	left	106°
Milk-sugar, . . .	"	59°.3			

This method has been applied to determine the amount of S. in diabetic urine, to ascertain the quantity of S. which remains in the unfermented state in wines, and to other similar purposes. As, however, the process is one of extreme delicacy, the method must be used with great caution.

Although S. is commonly regarded as a luxury, it is in reality a very valuable food (as, indeed, might be inferred from its presence in milk, and in both the yelk and white of eggs), since it is very rapidly digested, and supplies heat-forming or respiratory food to the system. Because S. is a fat-forming substance, it should be taken very sparingly in cases of excessive obesity. There are certain forms of dyspepsia in which S. should be avoided, as exciting increased gastric uneasiness; and in diabetes, all articles of food containing or (like starch) yielding S. should be rigidly prohibited. Although prone to fermentation when in dilute state, in its concentrated form S. possesses great antiseptic power, and is extensively employed to preserve both vegetable and animal substances from decay. The S. naturally existing in some fruits is often sufficient to insure their preservation in a dry state, and in other cases it is added, as in preserves and jellies. A mixture of salt and S. applied to meat, fish, etc., preserves more of the natural flavor than mere salting does. S. converted into caramel is much used by cooks and confectioners as coloring matter.

Manufacture.—The manufacture of S. from the sugar-cane and other sources, one of the largest branches of industry, is of comparatively recent date; and though there are evidences of its very high antiquity in India and China, S. appears to have been only vaguely known to the Greeks and Romans. It is mentioned by Theophrastus as 'honey in reeds;' and Lucan has the following line, which indicates

a knowledge of its existence, but merely as a curious fact:

'Quique bibunt tenera dulces ab arundine succos.'

Its introduction to Europe appears to have been one of the results of the Crusades. The sugar-cane was grown in Cyprus about the middle of the 12th c.; it was transplanted thence to Madeira 1420, and to San Domingo 1494, whence it spread to the neighboring islands and the Amer. continent. The art of boiling the cane juice was known in Gangetic India at least as early as the 7th c., for in the first half of that c. it was carried thence into China; and it was not until the close of the 15th c. that a Venetian discovered the art of making loaf-S , which soon became established in Germany. The first refinery of which any notice exists was in Dresden, as early as 1597; but long previous to this the subject had been discussed in learned treatises, e.g., the *Saccharologia* of Sala, in the beginning of the 16th c. Still the manufacture of S. in the countries to which it had been introduced made slow progress, being too expensive for use except by the wealthy. The material has now become one of the commonest necessaries of life, and has largely conduced to the health of nations. Until 1747, sugar was supposed to be the product of the sugar-cane only; but in that year, Marggraf, German chemist, demonstrated that is was a natural product of other vegetables, especially of the beet-root; and half a century later, its manufacture from that source was begun in Silesia. A large portion of the S. consumed on the European continent is now obtained from this source: see BEET-ROOT SUGAR.

In the United States and Canada very much S. is made by boiling the juice or sap of the Sugar Maple-tree (*Acer saccharinum*). The *Sorghum saccharatum*, or Sugar-grass (see DURRA), and the stalks of ordinary maize or Indian corn (*Zea*) yield S., which in quality can rival the best crystallized cane-S. (see SUGAR-CANE).

MAPLE-SUGAR.—Though nowhere conducted on an extensive scale, the manufacture of sugar from the sap of the maple-tree (see MAPLE) is carried on in many of the n. states and as far s. as Ky. The season for this work commences in Feb. or Mar., according to location, and continues three to six weeks. Cold nights followed by mild days are favorable; but as the warmth increases, the yield of sap and the proportion of sugar which it contains are diminished. When about 25 years old, the trees will give good yield of sap, and they can do this every year for 50 years or more without apparent injury. The sap is obtained by boring two or three holes, one-half inch or more in depth, in the trunk of the tree, one or two ft. from the ground, with an auger one-half or three-fourths in. in diameter. Into these holes spouts, eight or ten in. long, are placed, which conduct the sap into pails. In some large maple orchards the spouts lead to troughs which convey the sap to the sugar house; but the common custom is to collect it, every day, in a tank, or in barrels, which are drawn on a sled. It requires about five gallons of sap to make one lb. of sugar. The yield per tree, in an ordinary

grove and an average season, varies from three to six lbs. of sugar, but it is claimed that a few trees have yielded as much as 40 lbs. each. The sap is converted into syrup by boiling in a large kettle or pan placed in a brick or stone arch, or, preferably, in an evaporator, till it reaches the proper consistency, when it is strained and left for a few hours to allow any impurities to settle. It can be more perfectly clarified by the use of milk or the white of egg. The syrup is sold usually in cans. It should weigh 11 lbs. per gallon. By subjecting it to further evaporation, it can be converted into sugar, which can be run into tubs or molds of any form desired. By the process of refining, the distinctive flavor of maple sugar is entirely removed, and the product cannot be distinguished from cane-sugar. In all the operations connected with the manufacture of syrup or sugar the most scrupulous cleanliness should be observed. The first part of the season is the best, as concerns both quantity and quality of product. To prevent the change of a portion of the sucrose (cane-sugar) into glucose, which is not only deficient in sweetness, but also gives the product a rank flavor, it is necessary to evaporate the sap promptly. When properly made, maple-sugar is said to be the purest sucrose found in a natural state. But some of the material sold early in the season under this name is mixed with cheaper cane-sugar, and a great proportion of the maple syrup of commerce is largely adulterated with corn glucose. This adulteration is done principally in the large cities. Accurate statistics cannot be obtained, but the annual product of maple-sugar in the United States is estimated at about 50,000 000 lbs. Vt. and N. Y. are the largest producing states, the former making about 11,000,000, the latter about 10,000,000 lbs. The bounty offered to producers for 14 years from 1891, July 1, by the national govt., of 1¾ cts. a lb. for all sugar testing between 80° and 90° by the polariscope, and of 2 cts. a lb. on all which tests 90°, will probably considerably increase the manufacture of maple-sugar. As an indication of the wide territorial extent of the maple-sugar interest as compared with that of the cane-sugar, it is noted that previous to closing the books for the year applications for license, which would entitle to the bounty in 1892, were received from 3,932 people for making maple-sugar, and 730 for making sugar from cane. Fearing that the govt. inspection would delay sales at the opening of the season, when high prices rule, many of the leading maple-sugar makers did not apply for a license. But the applications made, and the statistics of production, show that while the manufacture of sugar from cane is confined to comparatively few people who do an immense business, that of maple-sugar is carried on by a great number of men, each producing a moderate quantity.

For the manufacture of starch-sugar, see GLUCOSE.

From the beginning of the 16th c., S. has been one of the most important products of the W. India islands. Careful cultivation has produced many varieties of this useful plant, some adapted for particular localities. The

original variety introduced into the W. Indies is still cultivated under the name *Creole Cane.* The Otaheite or Tahiti cane is taller, stronger, quicker in growth, and yields greater percentage of S.: the ribbon cane and the Bourbon cane are varieties of the Otaheite cane. There are many other varieties of *Saccharum officinarum*—e.g., the Batavian cane, most prized by rum-distillers; the Chinese cane, a very hardy plant.

The extraction of juice from the sugar-cane is effected by simple pressure. In its native country, India, there are still in use in some districts machines of the rudest construction, probably like those used a thousand years ago. The Chinapatam Sugar-mill consists of a mortar made by cutting down some hard-wood tree to within 2 or 3 ft. of the ground, and hollowing the top of the portion left standing in the ground into the form of a mortar. A

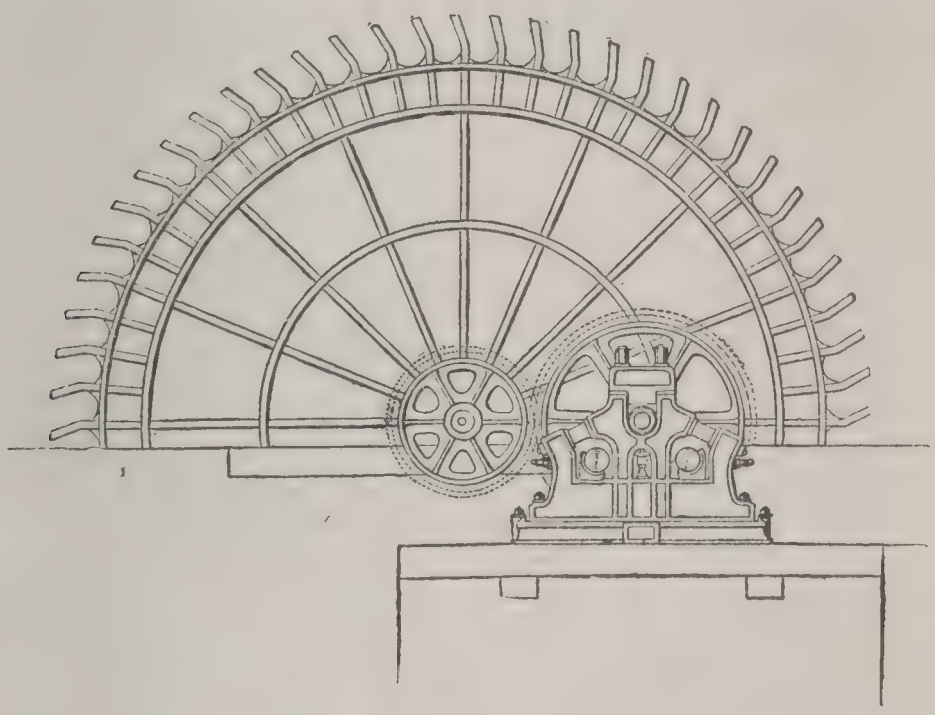


Fig. 1.

small hole is then bored obliquely through from the bottom of the cavity to the outside, and a pipe conveys the juice into a jar. A cylindrical piece of wood, sharpened at each end, acts as a pestle, which is kept in its place with sufficient pressure by a lever and by ropes. Small lengths of freshly-cut cane are placed two or three at a time, in the mortar; and a man sits on the other end of the train, balancing it, and at the same time drives oxen attached to the end of the beam, and keeping the movable parts of the mill constantly turning round. Very large quantities of S. are made by this rude contrivance in India. A much better one is the Chica Ballapura engine, which consists of two upright

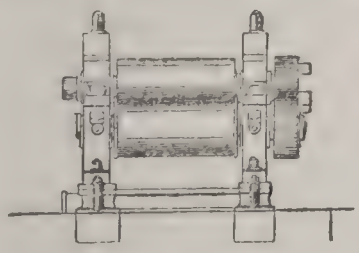


Fig. 2.

rollers, whose heads are formed into double spiral screws, which work in one another, so that when an ox is yoked to the long curved lever and goes around, one of the upright rollers, being connected with the lever, is made to revolve, and its screw carries the other one round, but in the opposite direction. The pieces of cane are fed in by hand between the rollers, and as the juice is squeezed out, it flows down into a small hollow below the frame made to receive it, whence a small trough carries it to an earthen pot. The frame of this mill is securely fixed with stakes driven deep in the ground. Probably this very ancient machine has been the origin of all the most modern ones, for they all consist of rollers placed either vertically or horizontally, between which the canes are made to pass.

The mills now in general use for squeezing the juice out of the sugar-canes are very powerful machines. Fig. 1. represents an end view of a cane-mill, with the iron water-wheel and gearing for driving it, and fig. 2 represents a front view of the same mill. Some idea of the strength of those mills will be formed from the fact that in one mill the three rolls—40 in. diameter, 8 ft. long—weighed 59,000 lbs. The capacity of such a mill is 50 tons of dry sugar a day of 12 hours. The manufacture has probably been carried to greater perfection in the islands of Java, Mauritius, and Cuba than in any other parts of the world. In Java especially, in consequence of the great extent of the plantations, the planters have been able to erect complete establishments for the manufacture of sugar.

The process of S.-manufacture is essentially as follows: The canes, freed from all loose leaves, are passed through between the rollers under the greatest possible pressure that can be brought to bear upon them. From 100 lbs. of canes, 65 to 75 lbs. of cane-juice will be expressed. This juice, which is of sweetish taste, and of the color of dirty water, passes direct from the mill to a small reservoir, where it usually receives a small dose of quicklime, and without delay runs off to large iron or copper vessels, heated either by fire underneath or by steam-pipes in the liquid. As the temperature of the juice rises, a thick scum comes to the top, which is either removed by skimming, or the warm juice is drawn off from below the scum. The concentration of the juice is partly effected in a series of large open hemispherical iron pans, of which five or six are placed in a row, with a large fire under the one at the end. This one fire, which runs along under the whole row of pans, is found sufficient to make two or three of them nearest the fire boil violently, and in addition, it warms the juice in the pans furthest from the fire. As the juice first enters the pans furthest from the fire, it gets gradually heated, and the vegetable impurities rise in scum to the top, and are carefully removed. As the juice is ladled from one pan to the next, it boils with greater and greater vigor as it approaches nearer the fire, until in the pan immediately over the fire it seethes and foams with excessive violence; and this seems to be essential to the successful making of sugar. It is known that

the presence of all those impurities which constitute the scum interferes with the crystallizing of the S.; and the rapid ascent of bubbles of steam through the liquid in the pans carries all impurities dispersed through the body of the liquid to the top, where they can be removed with facility. It is well known that great heat is very destructive to cane-juice; i.e., it turns much of the crystallizable sugar into molasses or uncrystallizable S., but the gain arising from the riddance of much of the impurity in the cane-juice more than compensates for destruction of part of the S. After the concentration has been carried to a given point, and all the scum has been parted with, the application of a high heat, which would act with increasingly destructive effect as the condensation becomes greater, is suspended, and the liquor, now of the color of turbid port wine, and of the consistency of oil, is drawn into the vacuum-pan, where the concentration is completed at the lowest possible temperature, generally about 150° F. The vacuum-pan is generally of copper, of spherical form 6–10

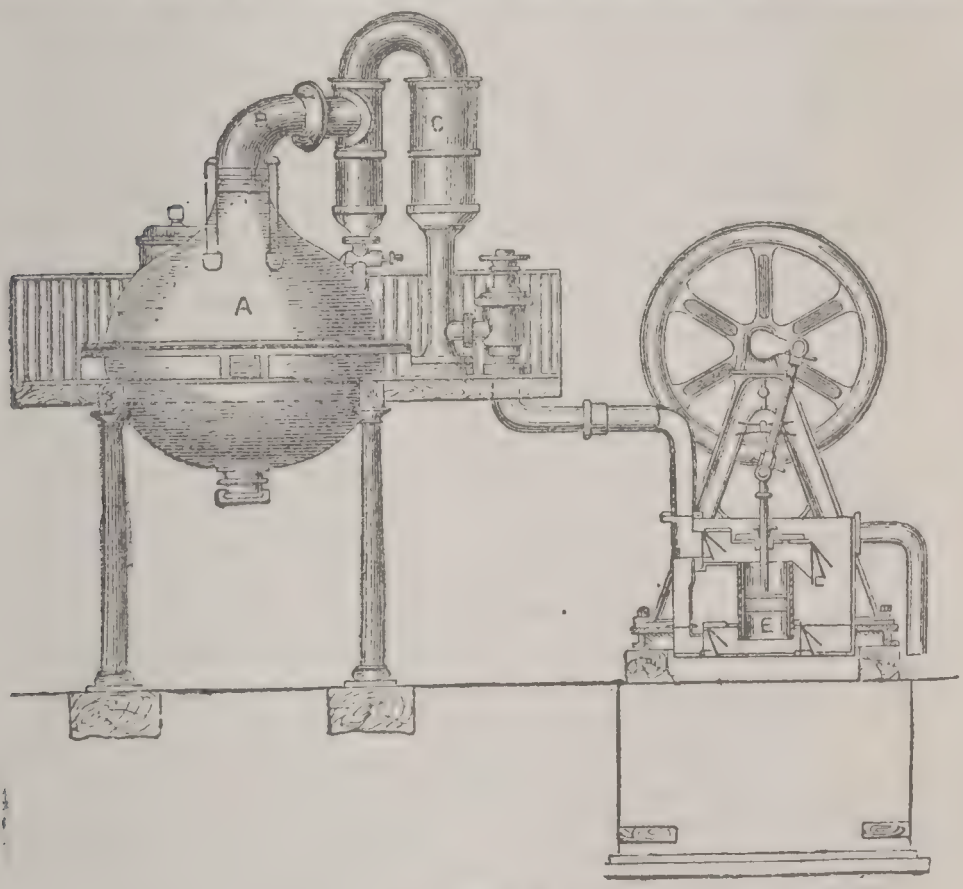


Fig. 3.

ft. diameter. The bottom is double, leaving a space of an inch or two for admission of steam between the two bottoms; and there is generally a long coiled copper pipe of three or four inches diameter above the inner bottom, so as to further increase the amount of heating surface. This apparatus is made perfectly air and steam tight. Leading from its upper dome, A, is a large pipe, B, communicating with the condenser, C, into which a rush of cold water is continually passing, to condense all the steam or vapor that arises from the liquid boiling in the vacuum-pan,

The water which is constantly rushing into the condenser is as steadily withdrawn again by the pump at E. There is thus a constant vacuum in the pan, consequently the liquid in it will boil at a much lower temperature than in an open pan or boiler. There is extraordinary advantage in being able to effect the later stages of the concentration at a low temperature, for it is when the liquid becomes thick that the destructive results of a high temperature become most excessive.

As the concentration of the liquid in the vacuum-pan proceeds, crystals of S. begin to form, and the skill of the sugar-boiler is shown by the uniformity of the crystals. The boiling is commenced by pouring in only about a third or fourth of the quantity that the vacuum-pan will hold, and gradually adding liquid as the crystals increase in size. The sugar-boiler is able to watch the changes going on in the vacuum-pan by means of small samples withdrawn by a suitable apparatus. When the vacuum-pan is full, the contents have thickened, by the formation of crystals of sugar, into a mass of the consistency of thick gruel; it is then allowed to descend into a vessel called the heater, where it is kept warm until it can be run into the 'forms,' which, in the sugar-growing colonies, are generally conical earthen pots, holding one to two cwts. of S. It is allowed to cool and complete its crystallization before the plugs, which close the bottom of the pots, are withdrawn; then one-fourth to one-third of the contents which have remained fluid runs off into gutters leading to large tanks, from which it is again pumped up into the vacuum-pan, and reboiled, yielding a second quality of S. This reboiling of drainings is repeated, with continually decreasing result in quantity and quality of the solid S., and it is rarely carried beyond the fourth boiling. If the planter wishes to obtain Muscovado or unclayed sugar, the process is now complete, and the S. is turned out of the forms, and packed for shipment.

If *clayed* sugar is to be made, the forms are allowed to stand for a few days until all the molasses has drained out; and a quantity of thin clay or mud, about the consistency of thick cream, is then poured over the S. to the depth of one or two inches. The water contained in this thin mud slowly percolates through the S, and mixing with the coatings of molasses still adhering to the outsides of the crystals of S., renders them less viscid, and facilitates their descent to the bottom of the form. The mud remains, at the end of a few days. in the form of a dry hot cake on the top of the S., and none mixes with the sugar.

The process of claying S. is simply washing off a coating of black or yellow molasses from a crystal of S., which is always white. This operation is possible without dissolving the crystal of S., because the molasses has greater affinity for water than the crystallized S. has. Anything that would yield a very slow and steady supply of water to the S., would do as well as mud or clay. There is always some loss of crystallized S. in the process of claying, and attempts have been made to use strong alcohol for

washing off the coatings of molasses from the crystals; but though alcohol dissolves molasses very freely, and scarcely acts on the crystals at all, it has not been found suitable commercially; and, besides the cost of the process, there is difficulty in riddance of the smell of alcohol from the sugar.

The centrifugal machine is designed to separate the molasses from the S.: by its use is accomplished in a few minutes work that would require days by the method of draining. Its action depends on precisely the same principle as that called into play when a sailor twirls a mop to expel the water from it. The centrifugal machine is a drum 3 or 4 ft. diameter, 12 to 18 inches high, revolving at great velocity on a vertical axis. The S., either direct from the vacuum-pan, or after it has been allowed to cool, is put, still mixed with the molasses, into the machine. As soon as the drum acquires high velocity, its contents are forced by the centrifugal action against the drum, the cylindrical portion of which is made like a sieve, and admits of the escape of the molasses, but retains the crystals of S. In a machine of three ft. diameter, revolving at the speed of 1,000 revolutions per minute (a speed of 1,700 revolutions is attained in some machines), the tendency of the molasses to escape will be 514 times its own weight; that is to say, it will have 514 times more force to fly off, than it has to drop off the crystal by the mere force of gravity.

In *Sugar-refining* the chief difficulties arise from the fact that the material to be operated upon is ever varying in quality. Not only is there a difference between the product of two different plantations, but even the manufacture of the same plantation shows differences of quality —arising chiefly from the presence of foreign substances, which interfere with the refining. Attempts to test the exact quality of solutions of raw S. by means of polarized light (see above) have had little success. Sugar-refining has three distinct objects—(1) production of loaves of thoroughly refined S.; (2) crushed S.; (3) white S. in separate crystals. Sugar-refining is carried on in this country on a great scale. There is very little raw S. used. Nearly all the yellow and dark-colored S. in the shops has passed through the hands of the refiners, and is simply inferior S., made of the syrup which drains from the white loaf-sugar.

Sugar-refineries are built eight or nine stories high, and the raw S. is first hoisted to the upper story where it is dissolved in large tanks of hot water, but with use of a small quantity of water. A quantity of bullock's blood is stirred into the solution of S., and the heat being gradually raised, the albumen of the blood coagulates, and rises to the surface in thick light scum, bringing with it nearly all the mechanical impurities floating in the fluid. The liquor, still hot, is then passed into the bag-filters, which are of very closely woven cotton cloth, capable of retaining the minutest mechanical impurity. To facilitate the passage of the liquor through the bags, they are suspended in a kind of iron closet, and surrounded by an atmosphere of steam

to keep the liquor hot. From the bag-filters, the liquor, freed from all mechanical impurities, but of dark color, flows into a lofty cylindrical iron filter, filled with animal charcoal, i.e., charcoal of bones. This charcoal is reduced to coarse powder; and the dark offensive liquor is allowed to percolate very slowly through the mass. The result is that it flows out at the bottom a perfectly transparent and pure solution of S. The charcoal can be used for only a few days at a time, because it gradually loses its purifying power; when the liquor begins to flow through it without being purified, it is taken out and reburned, which completely revives its powers.

The liquor as it flows from the charcoal filter is a mixture of pure S. and pure water, perfectly transparent. The application of heat is the only mode of expelling the water, and this unfortunately blackens the sugar again. For riddance of the water with as little heat as possible, the colorless liquor is boiled in the vacuum-pan as in the early process of the manufacture (see fig. 3). The liquor boils in vacuo at about 150° F., and even this moderate heat has the effect of turning it brown. When it has been sufficiently concentrated (in 1¼ to 2½ hours), it is run into the sugar-loaf forms, which, after cooling, are carried to a room kept warm by steam-pipes: this warmth facilitates the flow of the syrup out at the aperture at the bottom of the form. For riddance of the coating of colored syrup which still hangs about the crystals of S., a small quantity of saturated solution of pure white sugar is poured on the top of the form. This strong liquor is unable to dissolve any more S., but, being more fluid than the sticky coatings of syrup adhering to the crystals, it mixes with the coatings, and makes them fluid enough to flow down to the bottom of the form, leaving the crystals clear of syrup, consequently free of all color. The loaves of S., after standing some time, to admit of all the liquor draining off, are wrapped in paper, and dried in stoves heated by steam. The liquor draining from the forms is reboiled in the vacuum-pan, and forms loaves of inferior quality; and the liquor draining from the inferior loaves is again boiled into the yellow sugars known among sugar-refiners as bastards.

Crushed Sugar is simply inferior loaves crushed while still soft and moist, and packed in hogsheads, instead of being left in the loaf form. Granulated S. is produced by stirring the syrup while it is crystallizing; thus the S. is formed into small crystals or grains, instead of being compacted into a solid mass.

The syrup which drains from refined S. is reboiled, and is the *Golden Syrup* of the shops.

Crystal Sugar.—In making the S. crystals, all the processes are as in refining, until the syrup is clarified. Then it is boiled or concentrated in a vacuum-pan of larger size than ordinary, and the concentration is carried on until minute crystals appear. Fresh syrup is then added from time to time, great care and experience being requisite to insure regular feeding of the first-formed crystals, and to prevent formation of a second crop. When the crystals

are large enough, the contents of the pan are transferred to the centrifugal machines, which quickly separate the crystals in a perfectly dry state from the uncrystallizable syrup. The crystals are of square tabular form, with a deep groove across in one direction, dividing the crystal into equal parts. This kind of S. is much liked for coffee, etc., but the crystals dissolve slowly.

The commerce in S. is prodigious, but the trade in cane-sugar has been much disturbed by the bounty system (open or disguised) maintained by France, Germany, Austria, Belgium, Holland, Italy, etc. The consumption is: Great Britain 88 lbs. per head; France 26 lbs.; Belgium 75 lbs.; Russia 9 lbs.; Austria 43 lbs.; United States 66 lbs. The quantity of all kinds imported into Great Britain, 1902, amounted to 31,568,015 cwts.

In 1902 the production of beet-sugar in Europe was, in tons: Ger., 1,700,000; France, 874,300; Aus.-Hun., 1,021,100; Russia and Pol., 1,142,700; Belgium, 219,000; Holland, 102,000; Sweden, 77,000; Denmark, 46,900.

For the year ending June 30, 1896, the imports into and exports from the U. S. were as follows:

Imports.	Pounds.	Value.	Duty.
Not above No. 16 Dutch Standard.		$	$
Cane sugar from Hawaii free....	352,175,269	326,796	
Cane sugar 40 per cent duty.....	2,629,304,446	54,087,889	21,635,155
Cane sugar 40 per cent plus one-tenth cent per pound.....	11,403,335	252,803	112,524
Beet sugar 40 per cent duty.....	2,888,492	61,973	24,789
Beet sugar 40 per cent plus one-tenth cent per pound.....	564,168,608	13,085,752	5,798,469
Maple sugar 40 per cent.....	907,385	63,089	25,235
Above No. 16 Dutch Standard.			
Cane sugar 40 per cent plus one-eighth cent per pound.....	24,838,481	737,790	326,164
Cane sugar 40 per cent plus one-eighth plus one-tenth cent per pound.....	4,483,343	123,077	59,318
Beet sugar 40 per cent plus one-eighth cent per pound....	60,864,989	1,738,135	774,335
Beet sugar 40 per cent plus one-eighth plus one-tenth cent per pound.....	78,837,298	2,194,328	1,055,115
Maple sugar 40 per cent plus one-eighth.....	647	79	32
Molasses: all grades 2 to 4 cents gals.....	4,366,492		
Sugar candy all grades 35 per cent.....	118,354	665,194 22,221	80,181 7,777
Total, Sugar, molasses and candy	.....	84,369,443	29,896,099
Total for 1895.....	.....	69,055,672	15,599,342
Total for 1894.....	.....	128,654,198	272,131
Exports.			
Total 1895.....	.....	2,514,464	
Total 1896.....	.....	1,859,100	

The McKinley tariff of 1890 placed sugar on the free list and gave a bounty of 2 cents per lb. to American producers for sugar testing not less than 90°, and 1¾ cents per lb. for sugar less than 90° but not less than 80°. The total bounty

paid to the repeal of the law of Aug. 28, 1894, was $29,724,-274. The tariff law of 1894, levied a duty of 40 per cent on *all* sugar and $\frac{1}{8}$ cent per lb. additional on all sugar above No. 16 Dutch standard, and also $\frac{1}{10}$ cent per lb. on all sugar exported from countries paying an export bounty.

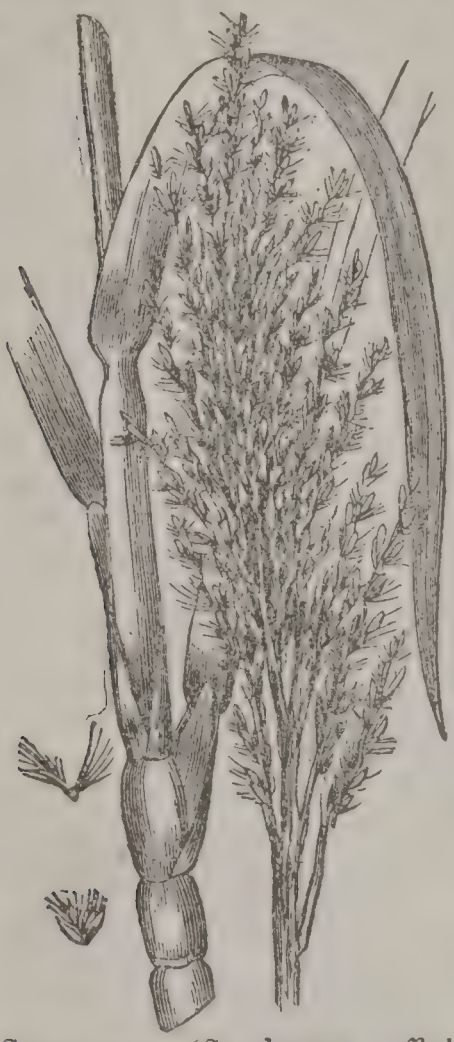
The American production by states 1892–94 is given below.

States where produced.	Pounds. 1892.	Pounds. 1893.	Pounds. 1894.
CANE.			
Louisiana	357,816,014	445,854,797	597,963,187
Texas	8,997,231	9,068,077	11,882,852
Florida	929,518	215,464	1,304,325
Mississippi	9,543	3,043	6,558
Total cane	367,752,306	455,141,381	611,156,922
SORGHUM.			
Kansas	1,136,086	1,026,100	882,572
Minnesota	.....	950	.....
Total sorghum	1,136,086	1,027,050	882,572
BEET.			
California	8,175,438	21,801,288	35,088,969
Nebraska	2,734,500	3,808,500	5,943,200
Utah	1,094,900	1,473,500	4,108,500
Virginia	.....	.....	50,627
Total beet	12,004,838	27,083,288	45,191,296
MAPLE.			
Maine	3,246	4,348	1,042
New Hampshire	82,503	174,544	147,790
Vermont	2,416,478	4,660,720	5,074,178
Massachusetts	7,013	54,589	48,996
New York	753,117	1,586,483	1,578,580
Pennsylvania	245,222	454,260	327,486
Maryland	117,600	150,915	143,160
West Virginia	8,968	9,017	12,000
Ohio	271,867	425,290	215,287
Iowa	1,300	.....	.....
Michigan	68,026	119,778	73,464
Minnesota	6,613	15,172	11,053
Total Maple	3,981,953	7,655,116	7,633,036

The same sugar production of the United States, 1900-01, was: Louisiana, 270,000 tons; Porto Rico, 85,000; Hawaii, 312,000. Cuba produced 600,000 tons; the total for America was 2,162,000 tons. In 1899 according to a census report, there were 31 beet-sugar factories in the United States, with cap. of $20,958,519; value products, $7,323,857. In Jan.-Oct., 1901, the United States imported 111,847,349 pounds of refined sugar above No. 16 Dutch standard, and 3,234,217,918 pounds of raw sugar.

SUGAR-BEET (*Beta vulgaris*): root, grown largely in Europe, and to some extent in this country, for production of sugar (see BEET-ROOT SUGAR: BEET). The quality of the root is varied greatly by soil and climate. A summer temperature much exceeding 75° is unfavorable. The land should be rich, manured and plowed the autumn previous to sowing, and again plowed in the spring. The latter plowing should be to a depth of 9 inches, and a subsoil plow should loosen the ground 5 or 6 inches deeper. Fresh yard manures should never be applied near the time of planting. Commercial fertilizers (see FERTILIZERS) containing considerable nitrogen and phosphoric acid with a large percentage of potash are highly beneficial. The soil must be finely pulverized. Planting is to be done as soon as the ground is dry and warm in the spring. Rows are to be about 18 in. apart, and, though the planting should be close, the beets should be thinned to stand 6 to 9 in. apart in the row. Very large roots are not desirable. An average weight of 1 lb. is sufficient. Cultivation must be frequent, and so thorough as to keep down all weeds. Where large quantities of the roots are grown, special machines for planting and cultivation are used. When mature, the roots are harvested. This work is sometimes done by hand, but various forms of the plow have been invented which loosen the roots so that they can be taken from the ground quickly and easily. The leaves are removed, and the roots taken to the factory, or stored in piles or houses in such a way as to prevent injury from rain or frost. Care is also required to avoid heating when large quantities are stored. The yield varies greatly, but 10 to 15 tons per acre are often obtained, and very much larger yields are frequently reported. The quantity of sugar usually varies from 8 to 15 per cent., but sometimes exceeds the latter proportion. The quality of the sugar is fully equal to that from sugar-cane. In order to be made profitable, the manufacture of the sugar must be on a large scale. The molasses from the beet-root is useful only as a fertilizer. The pulp, matter left after the sugar is extracted, is of some value for feeding to animals. Careful experiments indicate that the beet can be successfully grown for sugar in the United States through a zone about 200 m. wide, reaching from the Atlantic to the Pacific, including portions of New England, n. N. Y., Penn., O., Ind., Ill., and Wis.; s. Io., and portions of Neb., the Dakotas, and Cal. A bounty for production of sugar from the beet is paid by the national govt. and by some of the states. The greatest success in producing sugar from the beet-root in this country to 1891 has been in Nebraska. The total production in the world of sugar from the beet-root for the year 1890 was estimated at 3,600,000 tons, of which more than ⅓ was made in Germany. The sugar-beet is valuable for feeding to cattle, but many farmers prefer the mangel-wurzel on account of its larger yield (see MANGEL-WURZEL).

SUG'AR-CANE (*Saccharum*): genus of grasses, native to tropical and subtropical countries. The true S.-C. or Common S.-C. (*S. officinarum*) is not found wild, but is supposed to be a native of s.e. Asia. It was brought to s. Europe by the crusaders, and in the 15th and 16th c. found its way into all European colonies within the tropics. In Europe its cultivation has always been very limited, and is scarcely practiced except in Sicily and Andalusia. In China it extends to 30° n. lat., and in N. America to 32°; in the southern hemisphere only to 22° s. lat. It is perennial, but is killed to the ground by frost. The culms or stalks grow from a creeping root, are 8 to 20 ft. high, 1 to 2 in. thick, have well-marked joints 3 to 9 in. apart, and ribbon-shaped leaves 3 to 4 ft. long and 2 in. wide. As it approaches maturity, the cane throws up a smooth joint, 7 to 8 ft. long and ½ in. in diameter, called the arrow, which produces a long and handsome panicle of flowers. The saccharine juice, which gives the plant its commercial value, is contained in the pith which fills the ripened stalk for about two-thirds its length. Though there is a wide difference in their appearance, it is probable that the numerous varieties all belong to one species. The Creole, on account of the place of its introduction often called the Madeira cane, has been long cultivated. The Otaheite, including the ribbon and the Bourbon, is earlier, larger, and produces more sugar. The Batavian, from Java, is grown to some extent, and the Chinese (see below, CHINESE SUGAR-CANE) is cultivated farther n. than the ribbon cane succeeds. The S.-C. thrives best in the tropics and near the ocean, but is usually profitable as far n. as lat. 32° except on uplands where the mean temperature falls below 66°. The plant does not perfect its seed either in this country or the W. I. Propagation is effected by cuttings, which are usually taken from the main stalk and should be secured from the finest canes. They are put out in summer or autumn, according to the climate, in rows 5 or 6 ft. apart, and 2 ft. apart in the rows. The soil should be deep, fertile, and well drained, and cultivation should be sufficiently thorough to keep down all weeds. Chemical fertilizers are superior to manures,



Sugar-cane (*Saccharum officinarum*).

The latter are never to be used in a fresh state. Nitrogen is an essential element, but in excess it injures the cane for sugar production. It should not be used alone, but should be combined with mineral elements, and it is equally important that with the latter nitrogen should be employed. Potash in large quantities increases the yield of cane, but not the percentage of sugar which it contains. Phosphoric acid is one of the principal elements needed to make a good crop. As the plant ripens, the stem becomes hard, the leaves change color, and the juice thickens. The canes are cut close to the ground, the tops and leaves removed, and the jointed portion taken to the mill. Sprouts, called ratoons, grow from the roots, and furnish a new crop of canes. In this way a plantation can be maintained for several years; but as there is rapid decrease in the size of the cane, it is found best to make frequent renewals. From 12 to 20 per cent. of the weight of the cane, without tops or leaves, is sugar, but a portion of this is glucose, and quite a percentage is lost in the process of milling. The diffusion process, recently introduced, enables the manufacturer to secure a larger proportion of the sugar which the stalks contain. The yield of sugar varies from 500 to 2,000 lbs. per acre in La., and in the W. I. is said sometimes to exceed 7,000 lbs. Among the enemies of the S.-C. are rats, white ants, borers, and lice. They often cause heavy loss to the planter.—S.-C. was brought to this country from San Domingo about 1751 by Jesuits, who planted it on the banks of the Mississippi above New Orleans. The cane was ground by cattle till 1822, when steam-power was employed; and till quite recently the machines and processes used in expressing the juice and manufacturing the sugar have been very imperfect. Nearly all the S.-C. grown in this country is produced in three states, which have factories as follows: La. 704; Tex. 15; Fla. 11. The govt. estimate of the production of sugar from S.-C. in the United States for 1891 was 570,520,700 lbs.; total production of sugar from S.-C. in the world (1890) estimated 2,278,000 tons. —Chinese Sugar-cane, often called sorghum (*Sorghum saccharatum*), a variety of durra (see Durra), can be grown in any latitude suitable for Indian corn, and in a drier climate. It thrives better n. than it does far s. It is planted in May, in well-prepared ground, and in rows $3\frac{1}{2}$ ft. apart, with hills 2 ft. apart in the row. On low land, and in latitudes where the summers are short, the early-maturing varieties are to be preferred. Frequent but rather shallow cultivation should be given. Chemical fertilizers seem to give better results than farm-yard manures. If a large proportion of phosphoric acid is used, the ripening of the plant is hastened; but in excess it reduces the percentage of sugar in the juice. Nitrogen and potash must be supplied. The latter gives strength to the stalks and increases the quantity of sugar which they will yield. The quality of the plant varies greatly with the climate and soil in which it is grown. In warm regions it deteriorates rapidly, and even in cool climates it requires

careful selection and cultivation. There are many varieties. Of these, some were obtained from China, the imphee sorts from Africa, and many have been originated here by crossing different kinds. The plant should ripen, and be harvested before frost. When it approaches maturity, the leaves are to be removed, and the stalks cut close to the ground. The plant resembles Indian corn; grows, in good soil, 7 to 16 ft. high; but seldom matures its seed farther n. than lat. 41°. Nearly 50 per cent. of the ripened stalk is juice. Of this, 5 to 10 gallons are required to make a gallon of syrup. The yield varies greatly, but often exceeds 150 gallons per acre. Great difficulty has been experienced in separating the sugar from the other elements of the juice of the plant without seriously injuring the quality of the product, but the results of recent experiments with alcohol for precipitating the gums are quite encouraging. Syrup can be readily obtained wherever the plant thrives, but no method has yet been devised by which sugar can be profitably made on a small scale. When thickly planted, the stalks are of considerable value for green fodder, but to cure for winter use the cane is far inferior to Indian corn (see INDIAN CORN). Where the seed ripens, it is considered nearly equal in value to corn for feeding to cattle, sheep, and swine.—The cane was grown in France for some years previous to its introduction to this country 1856. The imphee, from Africa, was brought here the following year, but it has never become as popular as the Chinese cane.

SUGESCENT, a. *sū-jĕs'sĕnt* [L. *sugĕrĕ*, to suck]: in *OE.*, of or relating to sucking.

SUGGEST', v. *sŭg-jĕst'* or *sŭ-* [L. *suggestus*, carried or brought under—from *sub*, under; *gestus*, pp. of *gero*, I carry]: to offer to the mind or thoughts; to hint or refer to; to intimate or mention in the first instance; in *OE.*, to tell privately or secretly; to tempt; to seduce. SUGGEST'ING, imp. hinting; intimating. SUGGEST'ED, pp. SUGGEST'ER, n. *-ĕr*, one who suggests. SUGGEST'ION, n. *-yŭn* [F.—L.]: something offered to the mind or thoughts; a hint; private information; in *OE.*, secret incitement; temptation. SUGGEST'IVE, a. *-jĕst'ĭv*, affording matter for thought or reflection; containing a hint.—SYN. of 'suggest': to hint; allude; refer to; glance at; insinuate; intimate.

SUHL, *sōl:* town of Prussia, province of Saxony, govt. of Erfurt, on a small stream called the Lauter, in a romantic valley on the s.w. side of the Thuringian Forest, 29 m. s.s.w. of Erfurt. The name S., which in the Sorb-Wendish dialect means salt, is probably from the salt-springs, formerly much worked. Mining is extensive in the neighborhood, and has been so for centuries. The principal manufactures are iron and steel wares, chemical preparations, paper, and leather. S., celebrated in the days of chivalry as the 'Arsenal of Germany,' still has reputation as a manufactory of arms. Its history is very interesting; see Werther's *Sieben Bücher der Chronik der Stadt Suhl* (1847).—Pop. (1885) 10,605; (1890) 11,533.

SUHM, *sôm*, PETER FRIDERIK: Danish historian: 1728, Oct. 18—1798; b. Copenhagen; of an ancient and noble family. He graduated in law at the Univ. of Copenhagen 1748. He wrote numerous works on the early mythical and political history of Denmark; and edited *Scriptores Rerum Danicarum Medii Ævi*, IV.—VII. (Hafniæ 1776–92). In 1796, in return for a pension from the govt., he transferred to the Royal Library of Copenhagen his valuable library of 100,000 vols. Many valuable MSS. were printed at his sole charge; also he founded scholarships, and aided many poor students. S.'s writings were brought out by S. Poulsen, 16 vols., 1788–99.

SUICIDE, n. *sū'ĭ-sīd* [L. *sui*, of himself; *cædo*, I kill]: act of wilfully destroying one's own life; self-murder: N. a self-murderer. SU'ICI'DAL, a. *-sī'dăl*, partaking of the crime of self-murder; pert. to or tainted with the desire to commit suicide. SU'ICI'DALLY, ad. *-lĭ*. SU'ICI'DISM, n. *-dĭzm*, tendency to suicide.—*Suicide* was a heinous crime at common law, and is still so ranked, though in modern practice frequently modified to the character of an act of insanity. It was treated as venial by the Roman law, and was even the subject of panegyric by Stoic philosophers. Under the common law, as it existed in England and the countries that derive their civil polity from England, until modified by the practice of courts and by statutes, the body of a suicide was adjudged to be interred at a crossroads with a stake driven through it, and all his chattels, real and personal, were forfeit to the state. To-day, forfeiture of goods is the only penalty of S. in England, and that penalty is avoided on proof that the decedent was of unsound mind.—In the United States the fact of S. does not work forfeiture of goods in any case. The last will of a suicide, executed just prior to death, is not *ipso facto* void, but only on proof of the testator's insanity when he signed it. In life-insurance, the policy is voided, according to the decisions of courts in some of the states (Mass., Md., O.), also according to judicial decisions in England, France, Germany, and Holland, if the assured person commits S. 'intentionally,' whether sane or insane. But in American courts generally policies are voided only on proof of criminal self-destruction. In the state of N. Y., as in England, an attempt at S. is a misdemeanor punishable with imprisonment: see FELO DE SE.

There are even in modern times some who hold the theoretical opinion that S. is permissible in certain circumstances; but in the case of those who have actually committed or attempted the crime, there has almost always been detectable evidence of cerebral changes; or at least of that irritation and excitement which initiate and accompany molecular disorganization of the nervous structure. S. is a concomitant of certain bodily diseases; e.g., of dilatation and fatty degeneration of the heart, of blood-degeneration, of affections of the intestinal mucuous membrane, of the uterus, and of the brain and nervous matter; and it may be regarded as a frequent sequence of the melancholic, the morose, and hypochondriacal temperament.

It has appeared as an epidemic; it has been observed as a tendency hereditary in certain families; and as a tendency exhibited more frequently by men than by women (77 to 23); more frequently by the educated and affluent than by the industrial and ignorant classes; most frequently in large cities; and as directly engendered by luxury, political agitation, gambling, intemperance, and demoralization. It appears, however, that indulgence and asceticism, riches and extreme poverty, claim nearly an equal number of victims. It has been calculated that twice as many artisans commit S. as laborers. In most countries May and June show the largest number of suicides. Observation has shown that S. occurs in the greatest number of cases at the age of 55 years, when the suicides, according to the British tables, number 251 per million of the pop ; the ratio at 15 years is 28 per million; at 20 years 47; at 25 years 69; at 35 years 116; at 45 years 184; at 65 years 243; at 75 years 183; at 85 years 116. The most frequent mode of S. in the United States is shooting; in England hanging (men), drowning (women); Italy, shooting (men), drowning (women); in Prussia more than half the male suicides resort to hanging. Women in their choice of poison take less thought to select agents that bring death painlessly than do men; they employ rat-poison, carbolic acid, oxalic acid, etc.; while men more usually employ prussic acid, laudanum, etc. —The authorities on S. are Morselli, *Essay on Comparative Moral Statistics* (1881); Forbes Winslow, *Anatomy of Suicide;* Legoyt, *Le Suicide* (with valuable bibliography); Öttingen, *Ueber akuten u. chronischen Selbstmord;* O'Dea, *Suicide* (1882).

SUIDÆ, *sū'ĭ-dē:* family of mammalia, non-ruminant Artiodactyla (q.v.), having the feet generally four-toed, hinder feet sometimes three-toed; toes hoofed, the two front toes forming the principal part of the foot, the others smaller and scarcely touching the ground; the snout abruptly truncated, mobile, muscular, and sensitive, but not elongated into a proboscis; the tail short, or almost lacking; the incisor teeth variable in number, the lower ones all directed forward, the canines projecting, and bent upward; the stomach little divided. To this family belong hogs, wart-hogs, peccaries, etc.

SUIDAS, *sū'ĭ-das:* name given to the compiler of a *Lexicon* during the Byzantine empire. When he lived, or who he was, or whether he was even called S., no one can say; but it is customary to place him about the 10th or 11th c. Eustathius (12th c.) often quotes him. The *Lexicon* has this note prefixed: 'The present book is by Suidas, but its arrangement is the work of 12 learned men;' and though we can fix the date when several of the articles *must* have been written, it is impossible to ascertain whether they are the composition of the first compiler or of a later editor. The work is a sort of cyclopedia, giving an explanation of words, and notices of persons, places, etc., in alphabetical order. It is utterly without literary or critical merit, but is valuable to scholars for its numerous extracts from ancient Greek writers, grammarians,

scholiasts, and lexicographers, whose writings in many cases have perished. The first ed. appeared at Milan (1499); since, the best editions have been those of Küster Camb. 3 vols. 1705), Gaisford (Oxf. 3 vols. 1834), Bernhardy (Halle 2 vols. 1834), and J. Bekker (Berl. 1854).

SUI GENERIS, phrase, *sū ī jĕn'ér-ĭs* [L.]: of his or its own peculiar kind; singular; unique.

SUI JURIS, *sū'ī jō'rĭs* [L., of his own right, i.e., having right to act for himself]: in the Roman law, condition of a person not subject to the *Patria Potestas* (q.v.). The paterfamilias was the only member of a family who was *sui juris*, all the rest being *alieni juris*, including sons, unmarried daughters, the wife, and the wives and children of the sons of the paterfamilias. A daughter, on her marriage, passed into the family of her husband; but a son did not become *sui juris* by marriage. A son or unmarried daughter became *sui juris* on the death of the paterfamilias. In his father's lifetime, a son could become *sui juris* only by emancipation. The laws of the Twelve Tables declared that a son three times sold by his father should be freed from his power; and the ceremony of emancipation was of the nature of a fictitious sale performed three times, in order to liberate the son from parental control. *Connubium* being the foundation of the *patria potestas*, a bastard was *sui juris*.

SUING: see under SUE.

SUINT, n. *sō'ĭnt* [F. *suint*]: a peculiar fatty matter, rich in potash, which is found in wool, often in large proportions.

SUIR, *shôr:* river of Ireland, rising in north Tipperary, flowing s. through that county by the towns of Thurles and Cahir. Ten m. s. of Cahir it bends e., forming the boundary of Tipperary and Waterford, and passing by Clonmel and Carrick. It then passes out of Tipperary, and meeting the Barrow at Passage, Waterford, enters the sea in Waterford Haven, after a course of about 100 m. It is navigable by barges as far as Clonmel.

SUIT, n. *sūt* [F. *suite*, a following, a set of things following in one arrangement—from L. *secta*, a following, a sect, and also in mid. L. a suit at law, a suit of clothes, etc.—from L. *secūtus*, followed; *sequi*, to follow]: a number of things used together, as a suit of clothes; a set of the same kind, as a suit of cards: petition, prayer, or request; address of entreaty: courtship: an action at law; in *OE.*, attendance of tenants at the court of their lord; suit-service; regular order: V. to agree together, as things made on a common plan; to fit; to adapt; to please; to make content; to agree or correspond; to match or tally; in *OE.*, to dress; to clothe. SUIT'ING, imp. SUIT'ED, pp. SUIT'ABLE, a. *-ă-bl*, fitting; agreeable to; appropriate; proper; becoming; answerable. SUIT'ABLENESS, n. *-nĕs*, the quality or condition of being suitable; fitness. SUIT'ABLY, ad. *-blĭ*. SUIT'OR, n. *-ér*, one who sues; one who attends a court of law as a plaintiff or defendant; a petitioner: a wooer; a lover. SUIT'RESS, n. fem. *-rĕs*, a female applicant. TO FOLLOW SUIT, to play

a card of the same kind as that on the table; hence, to do as the others do, or follow their example. OUT OF SUITS, having no correspondence; out of harmony.—SYN. of 'suit, v.': to agree; fit; accord; comport· correspond; answer; coincide; concur;—of 'suitable': proper; becoming; correspondent; competent; agreeable; congruous; compatible; consistent; consonant; peculiar; particular; seemly; just; right, commodious; handy.

SUITE, n. *swēt* [F. *suite*, a succession, a retinue (see SUIT)]: a set of apartments; a body of attendants or followers; retinue; company.

SUIT IN CHANCERY: process corresponding to an action in a court of law: see CHANCELLOR: CHANCERY, COURT OF.

SUKHUM KALEH, *sō'kôm kâ'lĕh*, or SOUKCHOUM KALE, *kâ-lā'*: seaport of Asiatic Russia, govt. of Transcaucasia, on the e. coast of the Black Sea. In 1831, a commercial port was established here; which has surrendered its preëminence to Poti, a town about 70 m. s.e. S. K. was captured by the Turks at the beginning of the Russian war of 1877: then it was destroyed by fire, and is now only a heap of ruins.

SUL, RIO GRANDE DO: see RIO GRANDE DO SUL.

SULCATE, a. *sŭl'kāt*, or SUL'CATED, a. [L. *sulcātus*, furrowed; *sulcārĕ*, to furrow—from *sulcus*, a furrow]: in *bot.*, furrowed or grooved; having a deeply furrowed surface. SULCIFORM, a. *sŭl'sĭ-fawrm* [L. *forma*, shaped]: furrowed.

SULEYMAN, *sû-lā-mân'* (or SOLIMAN): Sultan of the Ottomans: see SOLYMAN I.

SULFATE: SULFONAL: SULFUR: ETC.: see SULPHATE: SULPHONAL: SULPHUR: ETC.

SULIMAN, *sô-lē-man'*, MOUNTAINS: mountain range more than 350 m. in length from n. to s.; the boundary between Afghanistan and the Punjab. In lat. about 33° 20′, it throws off the lateral branch of the Salt Range (q.v.). The highest summit of the S. M. is Tacht-i-Suliman (Solomon's Throne), 11,000 ft. high, covered with snow three months of the year.

SULINA, *sô-lē'nâ:* one of the lower branches of the Danube (q.v.), flowing through the middle region of the delta of the great river, and entering the sea about midway between the Kilia mouth on the n. and St. George's mouth on the s. It is the smallest outlet of the Danube, and conveys only $\frac{2}{27}$ of the main river to the sea; but its channel through the bar that lines the coast is deeper than that of the other mouths; therefore the S. is more frequented by vessels than any other branch of the Danube.

SULIOTS, *sū'lē-ots:* tribe who inhabited the valley of the Acheron, in the pashalik of Janina (*Epirus*) in European Turkey; a mixed race, partly of Hellenic, partly of Albanian origin. They are descendants of a number of families who in the 17th c. fled from their Turkish oppressors to the mountains of Suli (whence their name). In this obscure corner of the Turkish empire they prospered, and toward the close of the 18th c., numbered 560 families inhabiting 90 hamlets. For about 15 years they heroically resisted the encroachments of Ali Pasha (q.v.) of Janina upon their independence, even the women taking part in the strife. Vanquished 1803, they retreated to Parga, and afterward to the Ionian Islands, where they remained till 1820, when their old oppressor, Ali Pasha, hard pressed by the Turks, invoked their aid, offering them guarantees for his faith, and his grandson as a hostage. Eager to return to their cherished home, they accepted these terms, and under Marcos Bozzaris (q.v.) maintained a long and desperate conflict with the Turks, but were ultimately forced again to flee from their country, and take refuge to the number of 3,000 in Cephalonia, though a large remnant preferred to skulk in the neighboring mountains. Though they took a glorious part in the war of Greek independence, their country was not included by the treaty of 1829 within the Greek boundary-line; but most of them established themselves in Greece, where their leaders were raised to important offices. The old seat of the S. lies in the portion of Epirus which the Berlin Congress of 1878 recommended to be restored to Greece—a recommendation not carried out at the rectification of the Greek frontier 1881.—See Perrhaebos's *History of Suli and Parga* (1815; trans. 1823).

SULK, v. *sŭlk* [AS. *solcen*, sulky, remiss]: to be in a sullen humor; to be silently sullen. SULK'ING, imp. SULKED, pp. *sŭlkt.* SULKY, a. *sŭl'kĭ*, fitfully sullen; sour in temper; morose: N. a two-wheeled carriage for a single person. SUL'KILY, ad. *-lĭ.* SUL'KINESS, n. *-nĕs*, the state or quality of being sulky; sullenness. SULKS, n. plu. *sŭlks*, a fit of sullenness and discontent. TO BE IN THE SULKS, to be discontented and sullen.

SULLA *sŭl'la*, LUCIUS CORNELIUS (surnamed by himself FELIX): foremost Roman after the younger Scipio until the appearance of Julius Cæsar: B.C. 138—B.C. 78; of a family of the Cornelian *gens* or 'clan.' B.C. 107 he was elected quæstor, and sent to Africa with the cavalry that the consul Marius (q.v.) required for the Jugurthine war. He rapidly acquired brilliant reputation as an officer, and crowned a series of important services by inducing Bocchus, Mauritanian king, to surrender Jugurtha, whom he brought in chains to the Roman camp B.C. 106. Marius was not pleased at the distinction achieved by his subordinate. In the campaigns that followed B.C. 104–101 against the Cimbri and Teutones, S.'s reputation continued to rise, though Marius was still regarded (and with justice) as the first general of the state. For several years after the destruction of the barbarians, S. lived quietly at Rome taking

no part in public affairs; but B.C. 93 he stood for the pretorship, and won it by lavish distribution of money among the people. Next year, he was sent to Cilicia as propretor, to replace Ariobarzanes on the throne of Cappadocia, from which he had been driven by Mithradates. On his return to Italy B.C. 91, the long-smoldering animosity between Marius and S. was on the point of bursting forth; but the terrible *Social War* forced all Romans to postpone their quarrels until the common danger had been averted. Both Marius and Sulla commanded armies in this great struggle; but the successes of S. threw those of Marius into the shade, and the mortification of his rival was deep and bitter. B.C. 88, S. was elected consul with Q. Pompeius Rufus, and the senate conferred on him the command of the Mithradatic war. This command Marius passionately desired, and when he heard that S. had obtained it, he rushed headlong into treason and civil war. There was rioting at Rome, from which S. narrowly escaped to his legions in Campania.

Here it is to be observed that Marius and S. were not only personal rivals, but also leaders of opposite political parties. Marius, a man of humble origin (see MARIUS), was a rough, stubborn, irascible, and illiterate *plebeian*; S. a finely cultivated *patrician*, subtle and sagacious in policy, and winning in manners. In the terrible scenes that ensued, though S. showed himself by far the fiercer and more sanguinary of the two, it should not be forgotten that Marius began the contest. Allying himself with the tribune P. Sulpicius Rufus, a political adventurer in difficulties, Marius placed himself at the head of the new Italian party, on which the rights of Roman citizenship had been conferred, and hoped to force the senate to recall the appointment of S. to the command of the expedition to the East. S. finding his troops in Campania full of enthusiasm for him, resolved to lead them against the pseudo-government that had been set up at Rome. The Marian party was overthrown, and their leader wandered forth an exile. After settling affairs at Rome as well as he could S. embarked for the East B.C. 87, and was absent four years. Most of his fighting, however, was in Greece against Archelaus, ally of Mithradates, whom the latter repeatedly subsidized with men and money. Athens was stormed and plundered B.C. 86, and Archelaus was defeated with frightful slaughter at Chæroneia in the same year, and again near Orchomenos B.C. 84. S. having gathered immense plunder from the ancient and wealthy cities that he had sacked, crossed the Hellespont, crushed Fimbria, a gen. sent out by the Marian party (which, in S.'s absence, had again gained the power in Italy), forced Mithradates to sue for peace, and after extorting heavy contributions from the cities of Asia Minor, sailed for Italy and landed at Brundusium in the spring of B.C. 83. Marius had died, but his party was strong in numbers, if not in organization; yet, before the close of B.C. 82, that faction in Italy was utterly crushed. Meanwhile S.'s friends and adherents in Rome had been massacred, his estates

confiscated, and he himself declared a public enemy. In Spain, however, under the gallant and high-souled Sertorius (q.v.), the Marian party held out ten years longer.

When S. found himself master of the Roman world, and virtually Roman emperor, he turned to revenge. Then followed the fearful period of the *proscriptions* B.C. 81—a 'Reign of Terror' throughout Italy, with the object of literally extirpating the Marian faction. This wholesale murder has made infamous the name of S.; but it was only partially successful; and the next generation saw that party rise to more splendid predominence than ever in the person of Julius Cæsar (q.v.), nephew of old Marius. In B.C. 81 S. procured for himself the appointment of dictator, an office which he held until B.C. 79, during which period he framed a series of laws—the 'Sullan legislation'—designed to make the senate and the aristocracy as powerful as in the times of the Punic wars, but which failed of its end.

On resigning his dictatorship, S. retired to his fine estate at Puteoli, and abandoned himself to those sensual pleasures to which he had been deeply addicted from earliest manhood. His debaucheries hastened his end. S. was one of the most brilliant captains of ancient times: some of his campaigns were like a whirlwind. In affairs he carried out the bloodiest policy with a grim humor. His soldiers idolized him, because, always successful, he allowed them to plunder at will. As a statesman his utter lack of moral vision prevented him from any work that was permanent.

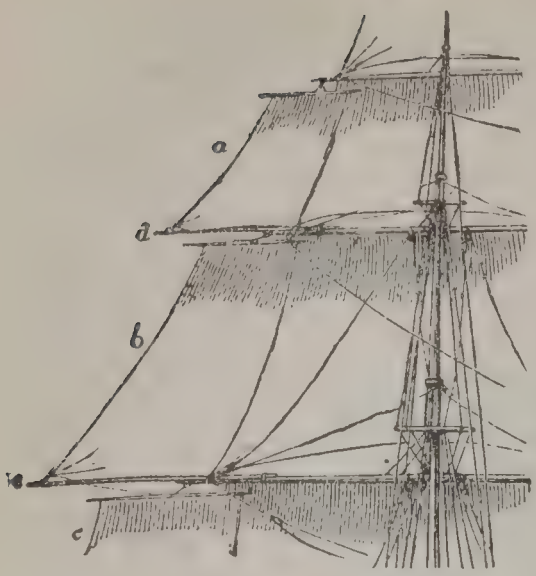
SULLAGE, n. *sŭl'ĭj:* collection of filth; a drain; sewage; silt and mud deposited by water: in *foundries*, the scoria which rises to the surface of the molten metal in the ladle, and which is held back when pouring, to prevent porous and rough casting.

SULLEN, a. *sŭl'lĕn* [OF. *solain*, solitary—from L. *solus*, alone]: morose; gloomily silent and angry; cloudy; dismal; in *OE.*, dull; sorrowful. SUL'LENLY, ad. *-lĭ.* SUL'LENNESS, n. *-nĕs*, a gloomy angry silence. SULLENS, n. plu. in *OE.*, morose temper; gloominess of mind.—SYN. of 'sullen': gloomy; malignant; untractable; obstinate; dark; heavy; dull; morose; sulky; sour; ill-natured.

SULLIVAN, *sŭl'ĭ-van*, ALEXANDER: politician: b. Amherstburg, Canada, 1841; of Irish parentage. In boyhood he settled in Detroit, Mich., and there conducted a shoe-store. He was collector of internal revenue in N. Mex. 1869, but was removed from office; a few months later he was made postmaster at Santa Fé, where he came into financial difficulty. He then settled in Chicago, and became reporter on the Chicago *Tribune*, and sec. to the board of public works. He has been prominent in the Clan-na-Gael, and pres. of the Irish National League of America. He was an active organizer of Irish-Amer. republican societies in the presidential canvass of 1884 and of 1888. Serious charges have been brought against him but have not been proved in the courts. He is a speaker of marked ability.

PLATE 1.

Strawberry
Summer Duck



Studding-sails.

Perpetual Alpine Strawberry (*Fragaria collina*).

Strombus.

Strepsiptera.

Sumach (*Rhus cotinus*).

Summer Duck (*Dendronessa sponsa*).

SUL'LIVAN, Sir ARTHUR SEYMOUR, MUS.D.: musical composer: b. London, 1842, May 13. He was educated in music at the Chapel Royal, St. James's, by private tutors, and at the Leipsic Conservatorium; produced his first composition, Shakespeare's *Tempest*, 1861; collaborated in comic operas with William S. Gilbert (q.v.) 1866–90; received the degree LL.D. from the Univ. of Cambridge 1876 and D.C.L. from Oxford 1879; was appointed a chevalier of the Legion of Honor 1878; knighted by Queen Victoria 1883, and given the order of the Medjidie by the sultan of Turkey 1888. He was principal of the National Training School for Music 1876–81; composed the *Te Deum* for the Prince of Wales's recovery thanksgiving; and conducted the Leeds Triennial Musical Festivals 1880, 83, 86, and 89, and the London Philharmonic concerts 1885 and 6. S.'s musical setting of the comic operas *H. M. S. Pinafore* *The Pirates of Penzance*, *Patience*, and *Iolanthe*, prepared in conjunction with William S. Gilbert, achieved immense popularity on both sides of the Atlantic. His graver works include: *The Prodigal Son* (1868); *On Shore and Sea* (1871); *The Light of the World* (1873); *The Martyr of Antioch* (1880); *The Golden Legend* (1886); and his recent lighter ones, *Princess Ida* (1884); *The Mikado* (1885); *Ruddigore* (1887); *The Yeoman of the Guard* (1888); *The Gondoliers* (1889) and his *Ivanhoe*. He died 1900, Nov. 22.

SUL'LIVAN, JAMES, LL.D.: statesman: 1744, Apr. 22—1808, Dec. 10; b. Berwick, Me.: bro. of Gen. John S. Having studied law under his bro., he settled in Biddeford, Me., and was king's attorney 1770. He was member of the Mass. provincial congress, 1775; judge of the superior court of Mass. 1776–82, and in the mean time (1779–80) member of the Mass. constitutional convention; delegate from Mass. in the continental congress 1784–5; member of the Mass. executive council and judge of probate of Suffolk co. 1787; state atty. gen. 1790–1807; gov. 1807, re-elected 1808. He was projector of the Middlesex canal, constructed by his son John Langdon S. He received from Harvard the degree LL.D. 1780. He wrote several works, mostly on political and legal questions; among them: *Observations on the Govt. of the United States* (1791); *The Altar of Baal Thrown Down, or the French Nation Defended* (1795); *Causes of the French Revolution* (1798); *Hist. of Land-titles in Mass.* (1801); *Constitutional Liberty of the Press* (1801).

SUL'LIVAN, JOHN, LL.D: soldier: 1740, Feb. 17—1795, Jan. 23; b. Berwick, Me.; son of Owen S., who was b. in Limerick, Ireland, during the siege by William III., 1691, and who d. 1796, having emigrated to America 1723. S. was a lawyer at Durham, N. H., and maj. in the militia 1772; delegate to the continental congress, Philadelphia, 1774; brigadier in the continental army besieging Boston 1775. After the evacuation of Boston by the royalists, S. commanded the n. army on the Canadian frontier, and unsuccessfully attacked the British at Three Rivers. He made a skilful retreat to N. Y. before a hostile force far superior in numbers, and with an army

scourged by smallpox. He was then made maj.gen. and appointed to chief command on Long Island, but yielded the post of honor to Gen. Benjamin Lincoln, his senior. With 8,000 half-armed and undisciplined troops, S. and Gen. Alexander (known as Lord Stirling) for a time held at bay a British force of 23,000 on Long Island: both generals were captured, but soon exchanged. S. rendered efficient service in the operations in Westchester co. On the capture of Gen. Lee, S. led the right wing to join Washington on the Delaware. He distinguished himself in the battle of Princeton. While the continental army was waiting for the British to attack Philadelphia, S. made a dash on the British force on Staten Island and took 100 prisoners. He commanded the right wing at the Brandywine and at Germantown. To prepare the way for an expedition into Canada, S., in command of 4,000 men, entered the cantons of the Iroquois in N. Y., and in one short campaign completely broke the strength of the great Indian confederation, 1779. His health having been seriously impaired by 5 years of continuous service in the field, S. resigned his commission, but 1780 was delegate in the continental congress, in which he was influential in procuring a reorganization of the army. He was member of the state constitutional convention of N. H. 1784, pres. (or gov.) of the state 1786–89, federal judge for the dist. of N. H. 1789 till his death. Harvard Coll. conferred on him the degree LL.D. 1780.

SUL'LIVAN, JOHN LAWRENCE: pugilist: b. Boston, 1858, Oct. 15. He began sparring 1879; first attracted public attention 1880; won championship of America at Mississippi City 1882; made several sparring tours, and defeated James Elliot, Herbert Slade, John M. Laffin, Alf. Greenfield, John Burke, Dominick McCaffrey, Patrick Ryan, and several lesser pugilists, 1882–87; fought draws with Patsey Cardiff in Minneapolis 1887, and with Charles Mitchell in Chantilly, France, 1888; defeated Jake Kilrain in a 75-round fight in Richburg, Miss., 1889, July 8; and lost the world's championship to James J. Corbett in New Orleans 1892, Sep. 7. He afterward appeared on the dramatic stage in sensational plays.

SUL'LIVAN'S ISLAND: large island, 6 m. below Charleston, S. C., between the harbor and ocean, the site of Fort Moultrie and of the summer residences of some of the citizens of Charleston.—See MOULTRIE, FORT.

SULLY, v. *sŭl'lĭ* [Dan. *söle;* Sw. *söla,* to bemire: Ger. *sühlen,* to sully]: to soil; to tarnish, as a character or reputation; to stain or darken; to dirty. SUL'LYING, imp. soiling; tarnishing. SUL'LIED, pp. *-lĭd:* ADJ. tarnished; stained.

SULLY, *sŭl'ĭ*, F. *sü-le'*, MAXIMILIEN DE BÉTHUNE, Duke of: famous minister of Henry IV. of France: 1560, Dec. 13—1641, Dec. 22; b. at the chateau of Rosny, near Mantes; second son of François, Baron de Rosny. The Duke of S. was known for most of his life as Baron de Rosny. The Rosny family, offshoot from the great House of Flanders, was never possessed of much wealth or influence, and had been reduced in both respects during the early religious wars. S. was early committed to the care of Henry of Navarre (afterward Henry IV., q.v.), head of the Huguenot party, which not only obtained for him an excellent education, but laid the foundation of a companionship which lasted till Henry's death. After narrowly escaping during the St. Bartholomew massacre, he accompanied his patron in his flight from court (1575), and, during the civil war which followed, exerted himself to the utmost, by daring valor in the field and by valuable engineering work, to serve the master for whom he cherished absorbing devotion. At the battle of Ivry 1590, he was seriously wounded, but captured Mayenne's standard. After Henry's authority had been well established, S., who had for years been his trusted adviser, became (1594) counselor of state and of finance. The financial affairs of the country were in frightful condition; from the chief of the department down to the lowest rural agent, the administration was an organized system of pillage, and but a small percentage of the taxes levied found its way into the royal treasury. The Baron de Rosny was the man to correct these abuses; he was surly, obstinate, haughty, but an excellent man of business, resolute, active, indefatigable, watchful of his master's interests. Upheld by the influence of Gabrielle d'Estrées and by Henry's own clear-sighted convictions, he cared nothing for the clamor and hatred of the court, which had largely profited by the former chaos. By personal exertion and indomitable perseverance, he brought affairs into order; though in diminution of the expenditure his efforts were not so successful; as the king, his mistresses, and the other companions of his pleasures, opposed retrenchment as far as they were concerned. In 1596 the disposable revenue of the state was 7–9 millions; in 1609 it was 20 millions, with a surplus of 20–22 millions in the treasury, and the arsenals and fleet were in excellent equipment. S. had supreme charge of various other branches of administration, promoting agriculture by diminishing the taxes of the peasantry, encouraging export-trade, draining marsh-lands, and constructing roads and bridges. S., while not an ideally wise and good minister, was far superior to the standard then in vogue for public men; and some of the scandalous publications about him are unworthy of credence. He was the servant of the king and government alone; and therefore was disliked by the people for his severity, by the Rom. Catholics for his religion, and by the Protestants for his refusals to sacrifice his master's or the country's interest for their sake. Accordingly, with the assassination of Henry, his su-

premacy was at once ended; and he was forced to resign the superintendence of finance 1611, though he retained his other high offices and was presented by Maria de' Medici with 300,000 livres as acknowledgment of his services. He had been created Duke of S. and peer of France 1606. He retired with great wealth, and lived in princely style. S. wrote *Mémoires des sages et royales Œconomies d'Estat de Henry le Grand, etc.*, a fantastic, wearisome, and disorderly collection of writings, but of great value to a historian of Henry IV.'s time: the work has been several times republished, as well as translated into English, German, and Russian. S. died at Villebon, near Chartres (Eure-et-Loir). Artists have generally represented S. as older than Henry IV.; but he was seven years younger.

SUL'LY, THOMAS: portrait-painter: 1783, June 8—1872, Nov. 5; b. Horncastle, England. He was brought by his parents to the United States 1792; began painting at 16 years of age with his brother Laurence in Richmond and Norfolk, Va.; and seven years later studied under Benjamin West in London. In 1810 he established himself in Philadelphia, and painted many eminent men, but excelled especially in graceful portraits of women, like that of Fanny Kemble in her girlhood. His Commodore Decatur is in the City Hall, New York; his Lafayette in Independence Hall, Philadelphia; in which city also his Queen Victoria (at 18 years of age) adorns the hall of the St. George Soc. Pres. Jefferson was painted by him, 1821, for the U. S. Military Acad.; and his Andrew Jackson and James Madison are in the Corcoran Gallery, Washington. His *Washington Crossing the Delaware*, often engraved, is in the Boston Athenæum. He painted a few other compositions, such as the *Capture of Major André;* and wrote *Recollections of an Old Painter* (1869, in *Hours at Home*) and *Hints to Young Painters* (1873), printed after his death in Philadelphia.

SULMONA, *sŭl-mō'nâ*, or SOLMO'NA: city of s Italy, province of Aquila, in Abruzzi; in a great fertile plain, watered by two rivers, and bounded by hills. It is well built, with one very wide central street. There is a handsome town-hall, a cathedral, and a convent built with stones from the ancient *Corfinium*. It has paper manufactories, dye-houses, and tan-yards. S. was the birthplace of Ovid. In the 8th and 9th c. it was sacked by the Saracens, but was restored under the Normans, and has ever since been a flourishing and industrious city.—Pop. (1881) 14,171, commune 17,601.

SULPH-, *sŭlf*, and SULPHO-, *sŭl'fō* [L. *sulphur*, brim-containing sulphur or sulphuric acid. A usual spelling for these prefixes is now SULF-, and SULFO-.

SULPHATE, n. *sŭl'fāt:* a salt formed by sulphuric acid with any base, e.g., *sulphate* of lime (see SULPHURIC ACID). SULPHATIC, a. *sul-fāt'ik*, pertaining to, containing, or resembling a sulphate. SULPHYDRATE, a compound of sulphur and hydrogen. SULPHIDE, n. *sŭl'fid*, a compound of sulphur with another elementary substance (see SULPHIDES, METALLIC). SULPHITE, n. *-fit*, a compound of sulphurous acid with a base. SULPHATE OF SODA, Glauber's-salts, consisting of sulphuric acid and soda. SULPHATE OF MAGNESIA, Epsom salts, consisting of sulphuric acid and magnesia. SULPHATE OF AMMONIA, a white crystalline substance, consisting of sulphuric acid and ammonia. SULPHATE OF LIME, gypsum, consisting of sulphuric acid and lime. SULPHATE OF IRON, common green vitriol, consisting of sulphuric acid and iron; copperas. SULPHATE OF ZINC, white vitriol, consisting of zinc dissolved in dilute sulphuric acid. SULPHATE OF COPPER, blue stone or blue-vitriol, consisting of sulphuric acid and copper.

SULPHIDES, *sŭl'fidz*, METALLIC; formerly known as *Sulphurets:* combinations of sulphur with a metal. Many occur native, and form very valuable ores. They all are solid at ordinary temperatures, and, except those of potassium, sodium, calcium, strontium, barium, and magnesium, are insoluble in water; they are, moreover, conductors of electricity. Many, especially of those that occur native, exhibit brilliant and characteristic colors. The same metal may have several S., and in general there is a sulphide for each oxide; though some of the S. have no corresponding oxides, and *vice versâ*. Most of these compounds may be fused at heat a little above redness; and if the air be excluded, the monosulphides (those containing one atom of sulphur and one atom of metal) remain unaffected; but many of the higher S., e.g., iron bisulphide (FeS_2) and tin bisulphide (SnS_2), give off an atom of sulphur, and are reduced to monosulphides. If, however, there is free admission of air or of oxygen to the heated S., they all are decomposed, the sulphur becoming oxidized and passing off as sulphurous oxide (SO_2), while the metal usually remains in combination with oxygen. Some native S. undergo reduction on mere exposure to the air, but the action is then generally limited to production of sulphates, unless oxidation is so rapid that the heat generated suffices to decompose the sulphate first. Nitric acid, concentrated, decomposes most S., with formation of metallic oxide, sulphuric acid, sulphur, and a lower oxide of nitrogen. Nitro muriatic acid has the same action, but more energetic.

The S. are prepared in various ways, of which the following are most important: (1) The monosulphides of the metals of the alkalies and alkaline earths may be obtained by decomposing their sulphates by igniting them in closed vessels with charcoal, the oxygen being removed in the form of carbonic oxide. (2) Many of the metals when heated with sulphur combine directly with it; iron sulphide, e.g., is usually prepared in this manner. (3) Hydrated sulphide

of tin, titanium, molybdenum, tungsten, vanadium, arsenic, antimony, bismuth, copper, lead, mercury, silver, gold, and platinum with its allied metals, may be obtained by passing a stream of sulphuretted hydrogen through neutral or acid solutions of their salts, when they are precipitated in an insoluble form; and the hydrated S. of zinc, iron, manganese, cobalt, and nickel may be prepared by double decomposition, by mixing a solution of the salt of the metal with a solution of a sulphide of one of the metals of the alkalies, e.g., potassium sulphide: thus, zinc sulphate mixed with potassium sulphide yields potassium sulphate which remains in solution, and manganese sulphide which falls as an insoluble precipitate. In many cases, the atoms of these hydrated S. are characteristic of the metal: thus, the hydrated sulphide of zinc is white; that of manganese, flesh red; those of cadmium, arsenic, and persulphide of tin are yellow; that of tersulphide of antimony is orange red; and that of the hydrated monosulphide of tin is chocolate brown. The S. of the more basylous (electropositive) metals unite with those of the more chlorous (electronegative) metals and of the non-metallic elements, forming sulphur-salts, in composition analogous to the oxygen-salts.

SULPHION, n. *sŭl'fĭ-ŏn* [formed from *sulphur*]: in *chem.*, the salt radical of the sulphates.

SULPHOCYANIC, a. *sŭl fō-sī-ăn'ĭk* [*sulphur*, and *cyanic*]: a name applied to an acid allied to prussic acid and found in saliva.

SULPHOCYAN'OGEN AND THE SULPHOCYAN'IDES: see THIOCYANIC ACID.

SULPHONAL, *sŭl'fō-nal* [*sulph(ur)* and *al(cohol)*]: hypnotic agent formed by combination of ethyl sulphydrate ($C_2H_5.SH$) with acetone ($CH_3.CO.CH_3$). It is a mild sedative and a slowly but progressively active hypnotic. The sleep following its administration is reported to be usually tranquil and refreshing; but S. ought not to be thus used without medical advice.

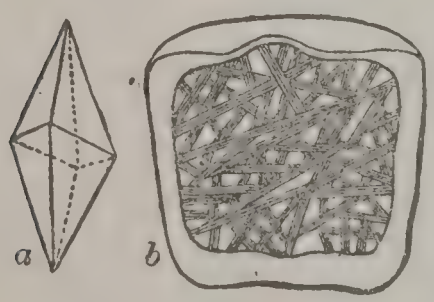
SULPHOSALT, n. *sŭl'fō-sawlt* [*sulphur*, and *salt*], or SULPHOSEL, n. *sŭl'fō-sĕl* [L. *sulphur*, and F. *sel;* L. *sal*, salt]: a salt containing sulphur in place of oxygen in the base.

SULPHOVINIC, a. *sŭl'fō-vĭn'ĭk* [L. *sulphur*, sulphur; *vīnum*, wine]: term applied to an acid produced by action of sulphuric acid on alcohol—acid sulphate of ethyl. The formula of Sulphovinic or Sulphethylic Acid, or Acid Ethyl Sulphate, is $C_2H_6SO_4$. The composition is the same as that of sulphuric acid, SO_4H_2, with half the hydrogen replaced by ethyl. This compound is formed by action of sulphuric acid on alcohol. It is prepared by mixing 1 part (weight) of strong alcohol with 2 parts concentrated sulphuric acid, heating to boiling, and then letting cool. Then the compound is diluted with water and neutralized with chalk, whereby much calcium sulphate is produced. *Calcium ethylsulphate*, a beautiful, colorless, transparent crystalline salt, is obtained from the clear solution.

SULPHUR, n. *sŭl'fĕr* [L. *sulphur*, sulphur]: one of the elementary substances, occurring in nature as a greenish-yellow, brittle, solid body, crystalline in structure, and exhaling a peculiar odor when rubbed, burning with a bluish flame, and emitting most suffocating fumes; brimstone (see below). SULPHUR ACID, an acid in which the oxygen is represented by sulphur. SULPHUR-ORE, the commercial term for iron pyrites, because sulphur and sulphuric acid are obtained from it. SUL'PHURY, a. *-fĕr-ĭ*, having the qualities of sulphur. SUL'PHURATE, v. *-fū-rāt*, to subject to the action of sulphur: ADJ. belonging to or resembling sulphur. SUL'PHURING, n. *-fĕr-ĭng*, exposure to the fumes of burning sulphur, as n bleaching. SUL'PHURA'TION, n. *-fū-rā'shŭn*, the subjection of a substance to the action of sulphur. SUL'PHURA'TOR, n. *-rā'tĕr*, apparatus for fumigating or bleaching. SULPHUREOUS, a. *sŭl-fū'rē-ŭs*, impregnated with sulphur, as fumes. SULPHU'REOUSLY, ad. *-lĭ*. SULPHU'REOUSNESS, n. *-nĕs*, the state of being sulphureous. SULPHURET, n. *sŭl'fū-rĕt*, compound of sulphur with hydrogen, or with a metal; former term for *sulphide*. SUL'PHURET'TED, a. combined with sulphur. SULPHURIC, a. *sŭl-fū'rĭk*, pertaining to or obtained from sulphur. SULPHURIC ACID, powerful acid formed of sulphur, oxygen, and water, much used in the arts and in medicine, popularly called *oil of vitriol* (see below). SULPHURIC ETHER (see below). SULPHUROUS, a. *sŭl'fĕr-ŭs*, containing or resembling sulphur. SULPHUROUS ACID, an acid formed and evolved in fumes from sulphur when burned in air (see SULPHUR, below). SULPHURETTED HYDROGEN, *sŭl'fū-rĕt'tĕd*, gas having the fetid odor of rotten eggs, composed of one equivalent of sulphur and two of hydrogen.

SUL'PHUR (symb. S., at. wt. 32, sp. gr. of rolled sulphur 1·98 [see ATOMIC WEIGHTS], and of amorphous sulphur 1·957; sp. gr. of vapor, 6·617 at 824° F., and 2·2 at 1900° F., atmospheric air being the unit of comparison for the vapor): one of the most important non-metallic elements. At ordinary temperature, it is a solid, brittle, tasteless, and inodorous body, of characteristic yellow color, and insoluble in water. A piece of solid S., heated to a temperature of 239°, fuses into a thin yellow liquid; while in closed vessels it may, by further heat, be distilled, the boiling-point being about 824°, and at this temperature it yields a deep yellow vapor, of sp. gr. 6·617. When the sulphur-vapor comes in contact with cold air it condenses in a fine yellow powder, known as *Flowers of Sulphur*. If fused S. be rapidly cooled, it solidifies into a compact mass, of granular crystalline texture; and if in its liquid state, it be allowed to run into cylindrical wooden molds, it is obtained in the ordinary form of roll-sulphur, or common brimstone; if, on the other hand, it be allowed to cool slowly, it crystallizes in long, glistening, deep, yellow, oblique prisms, with a rhombic base, which, however, soon lose their most characteristic properties. As native S. is frequently seen in yellow crystals, whose form is derived from the octahedron with a rhombic base, it is obviously

a dimorphous substance. It has been stated above that S. fuses at 239°; from that temperature up to 280°, it forms a yellow, transparent, limpid liquid; as the heat increases, the color becomes brown, and almost black, and the liquid becomes viscid, these changes being very distinct at 350°. If the external application of heat be steadily continued, for a while the temperature remains constant, but it afterward rises, and at nearly 500°, the S. again liquefies, though less completely than when first melted. If it be now suddenly cooled by pouring it, in a slender stream, into cold water, a spongy, tenacious, and plastic mass is obtained, which may be drawn on into elastic threads, whose color, after they have cooled, varies from amber to deep brown, according to the heat employed. After some hours, the ductile S. loses its characteristic properties, increases in density, and returns to the brittle form; or, if it be heated to 212°, it suddenly returns to the brittle condition, the temperature rising to 230° during the change. Hence, S. may be obtained in three (if not in more) allotropic states distinguished by the symbols Sα, Sβ, Sγ. The first variety, Sα, is the native octahedral crystal of S. (*a*); it may be obtained artificially by dissolving S. in carbon bisulphide or S. chloride, and submitting the solution to spontaneous evaporation. These crystals are semi-transparent, of amber-yellow color, and undergo no change on exposure to the air. The second variety, Sβ, is the oblique prismatic crystal above described as formed when fused S. cools slowly. The best method of obtaining these crystals is to melt a few pounds of S., and allow it to solidify on the surface. On perforating the external crust with a hot wire, and pouring out the sulphur that remains liquid, the interior of the cavity is found traversed in all directions by these crystals (*b*), occurring as transparent brownish needles, having a specific gravity considerably less even than that of roll-sulphur. On exposure to the air, they soon lose their coherence, and form an opaque and crumbling mass of minute rhombic octahedra. This conversion of the prismatic into the octahedral form takes place immediately, if the prisms are immersed in carbon bisulphide. The third variety, Sγ, is the plastic amorphous S., which has been sufficiently described.



S. is a poor conductor of heat, and the mere heat of a warm hand often causes it to crackle, and even to fall to pieces, from the unequal expansion. It is an insulator of electricity, and becomes negatively electric by friction. It is insoluble in water and alcohol: oil of turpentine and the fat oils dissolve it, but the best solvent is carbon bisulphide. When heated in the air, it takes fire at about 470°, burning with blue flame, and becoming converted into sulphurous oxide, whose pungent suffocating fumes are charac-

teristic of S. This element is second only to oxygen in its powerful affinity for other elements, with most of which it unites, often in several proportions. In its chemical relations it bears some analogy to oxygen: to very many oxides there are correspondent sulphides; and the sulphides often unite with one another, forming compounds analogous to oxysalts. With most of the metals it combines very readily, and in some cases, with development of light and heat; thus, silver and copper burn in sulphur-vapor just as iron-wire or zinc-foil burns in oxygen. Because of its power, with the aid of heat, of forming sulphurous oxide with the oxygen of the air, thus rendering the air incapable of supporting combustion, burning S. may be employed for extinguishing fire—e.g., in chimneys.

S. is widely distributed in the mineral kingdom, partly free and partly combined with other elements. The free S. is found either pure in regularly formed crystals, or intimately mixed with earthy matters. The principal supplies of crystalline S. are from Urbino in Italy, Girgenti in Sicily, and Radoboy in Croatia: the earthy sulphur is mainly from Italy, Moravia, and Poland. Iceland is rich in both varieties, but the mineral wealth of that island remains almost unworked. There are vast deposits of S. on the American continent: Mt. Purace in Colombia wears a cap of S. which is accumulating at the rate of 2 ft. per year. A S. deposit near Borax Lake, Cal., is estimated to contain 20,000 tons. In 1889, S. was mined in Utah and Nevada; the product being, ore 1,150 tons, S., 450 tons, valued at $7,850. Deposits of S. are known to exist also in La. The S. (crude flowers refined) imported into the United States 1889 was valued at $2,076,691. At present, by far the greatest quantity of the S. of commerce comes from Sicily; and, as a general rule, it is abundant in volcanic districts. In the form of sulphide, S. occurs abundantly in combination with iron, copper (iron and copper pyrites), lead (galena), zinc (blende), etc., iron bisulphide (or iron pyrites) furnishing most of the S. used in manufacture of sulphuric acid. S. is still more extensively distributed in the form of sulphates; the sulphates of calcium, magnesium, barium, etc., being abundant natural productions. In the vegetable kingdom, S. is a constituent (though to only a small amount) of the albuminous bodies so widely diffused in plants; and of certain volatile irritant oils, as those of mustard, garlic, asafetida, etc ; moreover, the vegetable juices contain it in the form of certain sulphates. In the animal kingdom, it is a constituent not only of the albuminous, fibrinous, and gelatinous tissues, but also of the hair, saliva, bile, urine, etc. The two animal substances in which it is most abundant are Cystin (q.v.), an occasional constituent of urinary calculi; and Taurin (q.v.), a constituent of the bile; in both of which it forms about one-fourth of the entire weight.

As to the *extraction* or *preparation* of S., it suffices here to state that the grosser impurities are removed by crude processes of fusion and distillation at or near the place whence it is obtained. The exported S. often undergoes

further purification. *Refined sulphur* is that purified by distillation in a large cast-iron still, and condensed in a receiver kept cool. When the vaporized S. is condensed in a large chamber, it is obtained in the form of *sublimed sulphur*, or *flowers of sulphur;* but as the walls become hot, it melts and collects on the floor, and is run into cylindrical wooden molds, from which, when cool, it is taken out as *roll* or *stick sulphur*. The residue in the retort is a mixture of S. with various impurities. Under the names *Black Sulphur*, or *Sulphur vivum* (commonly inquired for at the chemist's under the title *Sulphur of Ivy*), it is used in veterinary medicine and for dressing moldy hops. S. is thrown down from certain of its compounds (as from a strong solution of a polysulphide of calcium, sodium, or potassium) by dilute hydrochloric acid; it falls as a grayish-white, very fine, light powder, known in the Materia Medica as *milk of sulphur*, or *precipitated sulphur*. For the method of obtaining S. from iron pyrites, see Miller's *Inorganic Chemistry*, Wagner's *Chemical Technology*, etc. In the United States 101,950 tons of iron pyrites were mined (1889) for the S. contents, to be used in manufacture of sulphuric acid. The most common impurities in ordinary commercial sulphur are selenium and realgar (bisulphide of arsenic). Flowers of S. frequently exhibit a slight acid reaction, in consequence of a little sulphurous acid clinging to them: rinsing them with water at once removes this impurity.

S. is extensively employed in the arts and manufactures; as in the manufacture of matches, gunpowder, etc. When converted into sulphurous oxide and sulphurous acid (SO_2 and H_2SO_3), it is used as a powerful bleaching agent, also for destruction of insects, fungi, etc.; but its chief consumption is in manufacture of sulphuric acid.

There are two compounds of S. and oxygen—viz.:

	Composition by Weight.	
	Sulphur.	Oxygen.
S. dioxide, or Sulphurous oxide, SO_2	32	32
S. trioxide, or Sulphuric oxide (anhydrous sulphuric acid), SO_3	32	48

Both of these unite with water and metallic oxides, or the elements thereof, producing salts; those from SO_2 are *sulphites*, those from SO_3 are *sulphates*. The composition of the hydrogen salts or acids is:

Sulphurous acid, $H_2SO_3 = H_2O$ (water) $+ SO_2$ (S. dioxide).

Sulphuric acid, $H_2SO_4 = H_2O$ (water) $+ SO_3$ (S. trioxide).

Replacement of half or all of the hydrogen by metals produces sulphites and sulphates. There are several other S. acids (with corresponding metallic salts) which have no corresponding anhydrous oxides—viz.: Hyposulphurous acid, H_2SO_2, Thiosulphuric acid, $H_2S_2O_3$. Dithionic (or Hyposulphuric) acid, $H_2S_2O_6$, Trithionic, $H_2S_3O_6$, Tetrathionic, $H_2S_4O_6$, Pentathionic, $H_2S_5O_6$—all of the last four being called Polythionic acids [from Gr. *polus*, many; *theion*, sulphur]. Of all these S. oxides and acids, the most

important is SULPHURIC ACID (q.v.). Next in importance are *Sulphur dioxide* and *Hyposulphurous acid.*

Sulphur dioxide, SO_2, commonly called *Sulphurous acid* (the hydrogen salt, H_2SO_3, bears that name in chemistry), is the only product of combustion of S. in dry air or in oxygen gas. It can be prepared by heating undiluted sulphuric acid (H_2SO_4) with copper clippings, whereby cupric sulphate ($CuSO_4$), water (H_2O), and S. dioxide (SO_2), are formed:

$$Cu + 2H_2SO_4 = CuSO_4 + 2H_2O + SO_2.$$

S. dioxide is a colorless gas, possessing the suffocating odor of burning S. In its concentrated form it is quite irrespirable, and in diluted state it excites cough, and produces the symptoms of an ordinary catarrh. It is not only incapable of burning, but it rapidly extinguishes the flame of burning bodies. It is very freely soluble in cold water, which at 32° takes up nearly 69 times its volume of the gas, while at 75° it takes up only 32 volumes; the solution, which contains hydrogen sulphite or sulphurous acid proper (H_2SO_3), quickly absorbs oxygen from the air, and is converted into sulphuric acid. By the action of cold, S. dioxide may be condensed to a colorless transparent limpid liquid, which freezes at −105°, forming a transparent crystalline solid. The specific gravity of the gas is 2·21 (atmospheric air being the unit), and that of the liquid is 1·49, (water being the unit), the solid being considerably heavier. Dry S. dioxide gas and dry oxygen, when mixed, exert no action on each other; but when S. dioxide and water vapor are passed into a vessel cooled to about 21° F., a crystalline hydrate forms, containing about 24·2 per cent. S. dioxide to 75·8 water, or $H_2SO_3.10H_2O$. This gas is a common and abundant product of volcanic action, and is occasionally found in solution in the springs in volcanic regions. By reason of its solubility in water, S. dioxide should be collected over mercury. In addition to the uses of S. dioxide as a bleaching agent, it is valuable both as a disinfectant and as a powerful antiseptic: its latter property has been applied to preservation of meat, which, after exposure to this gas, will keep fresh for years, if it be inclosed in metallic canisters filled with nitrogen, to which a little binoxide of nitrogen has been added, to remove any trace of oxygen. But by far its most important use is as a first stage in the manufacture of sulphuric acid. In combination with bases, S. dioxide forms the *sulphites.*

Hyposulphurous acid, H_2SO_2, called also *Hydrosulphurous acid,* is formed by action of zinc on aqueous solution of sulphurous acid. The zinc merely removes an acid of oxygen, and the result is a yellow solution which has much greater decolorizing power than sulphurous acid itself, and quickly reduces salts of silver and mercury. But the solution is very unstable and quickly loses its bleaching power. A more stable product is obtained by immersing zinc clippings in concentrated solution of acid sodium sulphite, $NaHSO_3$, whereby are produced sodium hyposulphite, $NaHSO_2$, and zinc sodium sulphite, $Na_2Zn(SO_3)_2$, the latter being separable in crystals; see SODIUM.

With hydrogen, S. forms two compounds—viz., *Hydrogen monosulphide*, or *sulphuretted hydrogen*, or *Hydrosulphuric Acid* (q.v.); and *Persulphide of Hydrogen*, an oily liquid, having the smell and taste of sulphuretted hydrogen, and in many of its properties having an analogy to dioxide of hydrogen. S. combines with carbon to form a *Bisulphide of Carbon* (CS_2), a very volatile colorless liquid, of high refractive power, of acrid and pungent taste, and of very disagreeable odor. It is heavier than water, in which it is insoluble, but dissolves freely in alcohol and ether, and is the best solvent for S. and phosphorus. Bisulphide of carbon does not occur as a natural product, but may be obtained by heating fragments of charcoal to bright redness in a porcelain tube, and passing S. vapor along it. Its vapor, when freely inhaled, exerts an anæsthetic action similar to that of chloroform and of ether. Workmen in caoutchouc or other manufactures in which bisulphide of carbon is used as a solvent suffer much from prolonged exposure to its vapor, which produces headache, loss of appetite, impairment of vision and hearing, and general derangement of health by its deleterious action on the nervous system. S. combines with chlorine in several proportions, the most important of these compounds being S. *monochloride*, SCl (or S_2Cl_2), S. *dichloride*, SCl_2, and S. *tetrachloride*, SCl_4. These all are liquids, and are formed by direct action of the combining elements. The monochloride, SCl, or S_2Cl_2, is a yellow volatile liquid with penetrating and disagreeable odor. When dropped in water, it sinks to the bottom (its sp. gr. being about 1·687), and is slowly decomposed into hydrochloric and various S. acids, and free S. It is capable of dissolving about 67 per cent of S. at ordinary temperature; and like carbon bisulphide, is extensively used in vulcanizing India-rubber. S. dichloride, SCl_2, is formed by saturating the monochloride with chlorine: it is a deep-red liquid, resembling the preceding compound in most of its properties. S. tetrachloride, SCl_4, is prepared by saturating the monosulphide with chlorine at $-4°$.

S. seems to have been known from earliest times; and sulphuric acid was probably known to the Arabians. The manufacture of sulphuric acid in England dates from the 18th c. S. dioxide was investigated first by Stahl, Scheele, and Priestley; hyposulphuric acid was discovered by Welter and Gay-Lussac; hyposulphurous acid by Gay-Lussac and Herschel; trithionic acid by Langlois; tetrathionic acid by Fordos and Gelis; and pentathionic acid by Wackenroder. Scheele was the first who accurately studied hydrogen monosulphide, or sulphuretted hydrogen.

S. is used to a considerable extent and for very different purposes in medicine. It is given internally either as sublimed S. (flowers of S.) or as precipitated S. (milk of S.), in somewhat large doses, as a mild cathartic—its purgative effects being due to its stimulating the muscular coat of the intestines. Being both gentle and sure in its action, it is the best purgative in cases of piles or in stricture or other painful affections of the rectum. The only objection to

its use is that, from its becoming partly converted in the system into sulphuretted hydrogen, the evacuations, and even the insensible perspiration, often become abominably fetid, and continue so for some time after the primary operation of the medicine. As a purgative, the dose is about two drams, made into an electuary with molasses or honey. It is, however, generally combined with jalap and cream of tartar.

The *Confection of Sulphur* of the Pharmacopœia is composed of S., cream of tartar, and syrup of orange-peel rubbed together—the dose being half an ounce to an ounce, or one to two tablespoonfuls. In small doses, S. is of great value in cases of atonic gout and chronic rheumatism. An electuary known as *The Chelsea Pensioner*, consisting of sublimed S., 1 oz., powdered rhubarb, 2 oz., resin of guaiacum, 1 oz., cream of tartar, 1 oz., nutmeg, 1 oz., all finely powdered and made into an electuary with 1 lb. clarified honey, in doses of one or two teaspoonfuls night and morning. is a combination helpful in these cases Dr. Neligan states that steaming the lower bowel, by sitting over the vapor of warm water upon which a tablespoonful of flowers of S. had been sprinkled, is a valuable remedy in what is popularly known as a 'fit of the piles.' For external use of S. in the form of ointment, see ITCH. It is used externally also in many other cutaneous disorders, particularly in lepra and psoriasis; and in chronic cases its application in the form of vapor is often of service.

S dioxide in the shape of S. fumes, produced by burning sulphur, is much used as a disinfectant, and 'sulphur candles' are manufactured, in which the combustion of the S. is facilitated by combination with other materials. Fumigation with S. has been found to arrest the spread of the cattle-plague and other epizootics. In the U. S. *Pharmacopœia*, *Acidum sulphurosum* is directed to be prepared by 'treating sulphuric acid with charcoal by means of heat, receiving the acid into distilled water' (Dunglison). The use of the gas in medicine is based on its efficacy as a parisiticide and as a preventive of fermentation; hence its employment in zymotic diseases. A solution of sulphurous acid in water has a healing effect in 'primary wounds,' ulcers, burns, bed-sores, etc., also in erysipelas. Some physicians recommend inhalation of the spray of the solution or of the diluted gas in cases of croup, asthma, bronchitis, laryngeal affections, scarlatina, and typhoid. Of the *sulphites*, those of sodium, potassium, magnesium, and calcium are employed in medicine. The sulphites of sodium and of magnesium have been tried in eruptive fevers, diphtheria, typhus, typhoid, cholera, etc., with good results.

SULPHU'RIC ACID (H_2SO_4, or H_2O,SO_3): chemical name of the liquid commercially and popularly known as *Oil of Vitriol.* It received this name from having been produced first by distillation of green vitriol (sulphate of iron); Basil Valentine being usually credited with the discovery: see ALCHEMY. It is a dense, colorless, oily liquid, without smell, of sp. gr. 1·846 at a temperature of 60°, and of intensely acid taste and reaction. It has a powerful caustic action, and chars and destroys organic matters from its strong affinity for water; and, because of this destructive property, it must be handled always with greatest caution. So powerful is this affinity, that if the acid be exposed for a few days to the air in a shallow dish, so as to present a large surface, it often doubles its weight by absorbing aqueous vapor from the air; and, because of this property, it is extensively used in laboratory operations as a desiccating agent. It mixes completely with water in all proportions; and, as great heat is given out at the moment of mixture, the dilution should be performed by very gradually adding the acid to the water. When cold, the mixture occupies less bulk than the two components previously occupied. S. A. freezes at −15°, and boils at 620°, and just above the boiling-point it assumes the form of a vapor with sp. gr. 2·15. Oil of vitriol is not the only hydrate of sulphuric oxide: three others are known. When the fuming oil of vitriol of Nordhausen is exposed to a low temperature, a white crystalline substance separates, which is a hydrate, containing half as much water as the common liquid acid. Its formula is $H_2S_2O_7$, or $H_2O(SO_3)_2$: its fusing-point is 95°. Again, a mixture of 98 parts of the strong liquid acid and 18 of water ($2H_2O.SO_3$, or $H_2SO_4.H_2O$), freezes at a temperature above 32°, and crystallizes into splendid rhombic prisms, from which property it is often termed *glacial sulpurhic acid:* it boils at 435°, and its sp. gr. is 1·780. Lastly, when a very dilute acid is concentrated by evaporation *in vacuo* over oil of vitriol, the evaporation stops when the sulphuric oxide (SO_3) and water bear to each other the ratio 80 : 54, which answers to the formula $3H_2O.SO_3$, or $H_2SO_4.2H_2O$. The compound formerly known as *anhydrous sulphuric acid* (SO_3, now denominated Sulphur trioxide, or Sulphuric oxide) possesses none of the characteristic properties of an acid: see SULPHURIC ANHYDRIDE: CHEMISTRY.

S. A. in its free state is a very rare natural product, though, in combination with bases, it is common in the animal and vegetable, and abundant in the inorganic kingdom. The only cases in which it is known to occur free are those of certain American rivers, especially the Rio Vinagre in Colombia, which daily carries 37,600 kilograms—about 80,000 lbs.—of S. A., and some lakes in Tenn., in La., and in Java; and it has been found a normal constituent of the saliva of *Dolium galia*, a species of snail found in Sicily. In all these cases, the acid is in extremely diluted form. In plants it exists in the juices; and in animals, in the blood and its derivates, chiefly in the form of sulphates of the alkalies; while in the mineral

kingdom it occurs as gypsum (calcium sulphate), heavy spar (barium sulphate), celestine (strontium sulphate), etc.

S. A. may be prepared on a small scale by boiling sulphur in *aqua regia*, or in nitric acid, the sulphur becoming gradually oxidized into S. A. As a general rule, however, the commercial acid is employed even for laboratory experiments (see below).

To obtain the acid pure, suitable for medical use or medico-legal analyses, it must be redistilled with ammonium sulphate in a retort containing a few slips of platinum foil, the first and last portions being rejected. The distillation is attended with violent concussions, due partly to the high specific gravity of the acid, partly to its high boiling-point; and this convulsive action is moderated mechanically by the platinum slips. S. A. thus prepared according to the directions of the Pharmacopœia may be regarded as perfectly pure, presuming arsenic is not present. Strong S. A. has comparatively little action on the metals except at high temperature, when it dissolves them, and, at the same time, undergoes partial decomposition; the metal being oxidized by a portion of the acid which becomes decomposed into oxygen and sulphurous acid, and then uniting with a portion of undecomposed acid to form a sulphate. Silver, copper, mercury, arsenic, antimony, bismuth, tin, lead, and tellurium are thus acted on. Gold, platinum, rhodium, and iridium are not affected by the acid even at boiling temperature. The more oxidizable metals, such as zinc, iron, nickel, and manganese, are readily soluble in the dilute acid, water being decomposed, and hydrogen liberated, while the oxygen of the water unites with the metal; and the metallic oxide, at the moment of its formation, combines with the S. A. to form a sulphate.

The *sulphates*—or salts formed by the combination of S. A. with a base—are generally composed, as in the case of green vitriol ($FeSO_4.7H_2O$, or $FeO,SO_3.7H_2O$, ferrous sulphate), of 1 equivalent of acid and 1 of metallic oxide, with or without water of crystallization. With the alkalies, this acid also forms acid salts, as potassium bisulphate; and in a few cases, copper, e.g., it forms basic salts. The insoluble sulphates, e.g., that of barium, may be obtained by precipitating a soluble salt of the base by a soluble sulphate; thus, barium nitrate and sodium sulphate yield an insoluble barium sulphate and sodium nitrate, which remains in solution. The soluble sulphates may be prepared by dissolving the oxide or carbonate in dilute S. A., in those cases in which the metal itself is not readily attacked by the acid. S. A. and the soluble sulphates are easily detected by their yielding, with a solution of a barium salt, a white precipitate of barium sulphate insoluble in acids.

This acid is employed in the arts and manufactures for numerous purposes. Its use as a desiccating agent for laboratory purposes has been noticed above; and for its application to the development of oxygen gas, see OXYGEN. But its greatest consumption, doubtless, is in the

preparation of the *Salt-cake*, used in the manufacture of Carbonate of Soda (q.v.).

In medicine, two preparations of S. A. are used—viz., *Diluted S. A.* and *Aromatic S. A.* *Diluted S. A.* is prepared, according to the U. S. Pharmacopœia, by adding to 2 ounces of S. A. as much distilled water as will make a pint of the mixture. The dose is 10–20 drops, largely diluted. *Aromatic S. A.* (*U. S. Pharmacopœia*) is made of S. A., 6 oz.; ginger, in coarse powder, 1 oz.; cinnamon, in coarse powder, 1½ oz.; alcohol, a sufficiency. These preparations exert strong astringent power, and are serviceable in all forms of passive hemorrhages, and in checking inordinate discharges arising from debility. In ordinary diarrhea, and even in the premonitory diarrhea of cholera, dilute S. A. is of great use. In painters' colic, it is given in order to convert any lead that is absorbed into an insoluble sulphate, which is inert: S. A. lemonade also is used as prophylactic against the disease. As this acid exerts deleterious action on the teeth, it should be taken by suction through a quill. In some cases, it is prescribed not so much for its specific as for its solvent power; with this object, it is prescribed usually with quinia. The strong acid is used in surgery as a caustic. In cases of *poisoning* with this acid, the most prominent features are: burning pain extending from the mouth to the stomach, intense pain in the bowels, vomiting, great prostration, coldness of the surface, and fetor of the breath. The mucous membrane of the parts injured by the acid is at first converted into a white slough, which soon becomes black, and the patient usually dies from exhaustion within 24 hours. The best antidotes are the alkaline bicarbonates, or carbonate of magnesia. If the primary symptoms be conquered, often the patient dies subsequently from stricture of the œsophagus.

Sulphuric Acid Manufacture.—The manufacture of S. A. depends on the fact that when sulphurous oxide (SO_2), nitrogen peroxide (NO_2), and water (H_2O) are present together in certain proportions, the sulphurous oxide becomes oxidized at the expense of the nitrogen peroxide, the latter being reduced to nitric oxide by loss of half its oxygen. The material from which the requisite sulphur is obtained is generally iron pyrites. This is roasted in a series of ovens in a current of air. The sulphur burns off, leaving oxide of iron, with small quantities of silver and copper oxides: a separate operation is employed to obtain those metals. The gases from the ovens—a mixture of sulphur dioxide and atmospheric oxygen and nitrogen—are passed through pots containing oil of vitriol mixed with a little nitrate of sodium; the object of this is to provide the mixture of nitric acid and nitrogen oxides which, as has been seen, helps to oxidize the sulphurous oxide. All these gases and vapors are now conducted into the first of a series of mixing chambers made of sheet-lead. Here jets of steam are introduced at intervals, supplying the water necessary for formation of S. A. The chief reactions are seen in the following equations, of which the first repre-

sents the oxidation of the elements of sulphurous acid into sulphuric acid by the nitric peroxide:

$$NO_2 + SO_2 + H_2O = NO + H_2SO_4.$$

The second expresses the restoration of the oxygen to the nitric oxide by the air, which is always present:

$$NO + O = NO_2.$$

Thus a relatively small quantity of nitric oxide in presence of a continuous supply of sulphurous oxide, air, and steam, converts this mixture into S. A. Thus produced, the acid collects in liquid form at the bottom of the chambers; and when it has reached a certain degree of concentration (60–65 per cent. of S. A.), the liquid is drawn off and concentrated, first by evaporation in open leaden pans, then in boilers of glass or platinum, in which weak acid distils over and is saved, leaving the concentrated acid, which is transferred to carboys, and is then ready for sale.

At the end of the series of reactions which proceed in the vitriol chambers, after condensation of the S. A., the nitrogen of the air and the greater part of the nitrous oxide remain in the gaseous form. These highly noxious nitrous gases are not discharged into the atmosphere, as was formerly the custom, but are collected from the last of the leaden chambers, and taken back into the first of the series. The former operation is effected by means of a tower filled with coke on which S. A. continually flows. Meeting the gases issuing from the chambers, this stream of S. A. absorbs from them the oxides of nitrogen, forming a nitrosyl sulphate, which remains dissolved in excess of S. A.:

$$2NO + O + 2H_2SO_4 = 2NOHSO_4 + H_2O.$$

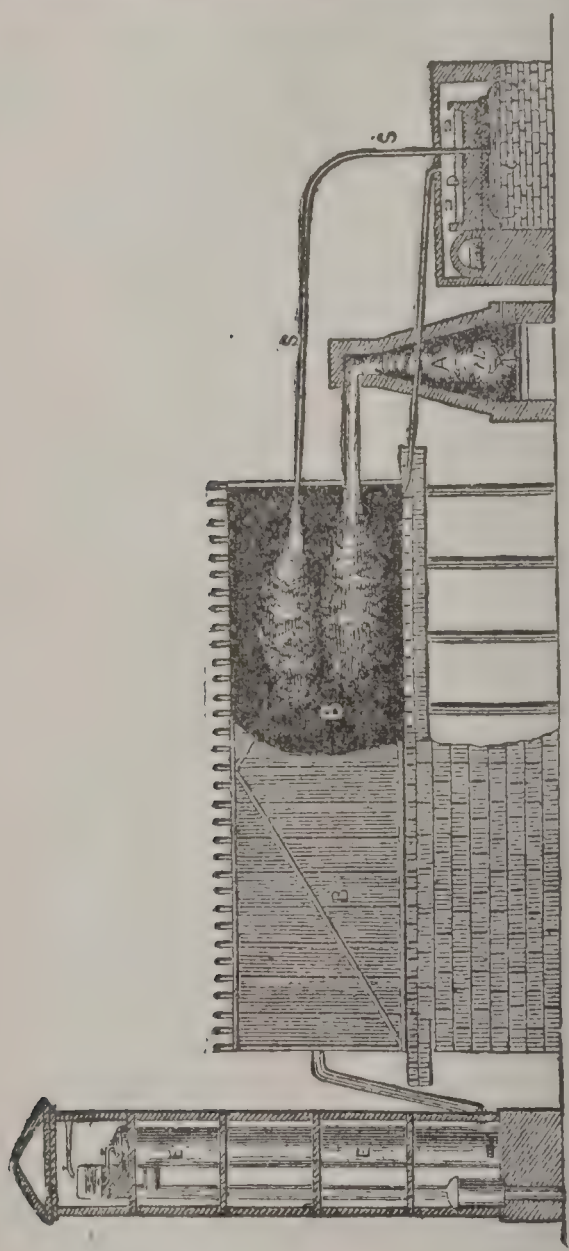
Then, in order to recover the nitric oxide from this compound, the acid solution may be decomposed by steam, but usually it is forced up to a tank at top of another tower filled with flint-stones, and communicating at the upper part with the first chamber of the series, and at the bottom connected with the flue leading from the pyrites ovens. A second tank at the top of the same tower is filled with the comparatively weak acid from the chambers. The two liquids are allowed to flow in regulated streams, so as to mix in the upper part of the column of flints. The reaction which occurs is produced by the water of the weaker acid decomposing the nitrous constituent of the stronger:

$$2NOHSO_4 + H_2O = 2H_2SO_4 + NO_2 + NO.$$

The gases thus liberated are swept back by the ascending current of hot sulphorous gas and air, and pass into the leaden chamber, while the S. A., deprived of nitrogen compounds, runs out at the bottom into the leaden evaporating pan, where the process of concentration goes on. The first tower is called the Gay-Lussac tower, the second the Glover tower—both after their inventors.

When sulphur is the material used for producing the S. A., it is burned in an oven or 'burner' (A) of brick-work, having a sole or bottom of iron, termed the 'burner-plate,'

Under this, a small fire is at first lighted, which is allowed to go out after the sulphur has ignited. A little above the sulphur, a small pot, called the nitre pot, *n*, is either placed on a stand or hung from the roof, filled with a quantity of either nitrate of sodium or nitrate of potassium, with S. A. sufficient for its decomposition—8–10 lbs. nitre, with 5–6 lbs. S. A. being allowed for every 112 lbs. of sulphur. The decomposition of the nitre by action of heated S. A. furnishes nitric anhydride fumes, which go over into the chamber with the sulphurous oxide. The sulphur-



Manufacture of Sulphuric Acid:
A, sulphur-burner or furnace; B, lead chamber, shown in section at B′; C, steam-boiler; D, leaden pan; E, coke tower; S, steam-pipe; *n*, nitre pot.

ous oxide readily abstracts from the nitric anhydride the additional equivalent of oxygen required for its conversion into sulphuric oxide, reducing the nitrous compound from nitric anhydride, N_2O_5, to nitrous anhydride, N_2O_3, the reaction being:

$$2SO_2 + N_2O_5 = 2SO_3 + N_2O_3.$$

Nitrous anhydride in turn is quickly converted into nitric anhydride, N_2O_5, by abstraction of two additional equivalents of oxygen from the air which is constantly

entering the chamber. Again, in presence of moisture (supplied by a jet of steam from boiler C), sulphurous oxide readily deprives the nitric anhydride of two equivalents of oxygen, and thus forms two volumes of sulphuric oxide, and again liberates nitrous anhydride, which is ready once more to seize on the oxygen of the air, and would continue so acting and reacting *ad infinitum*, were it not carried forward and out by the chimney provided for escape of the freed nitrogen.

The chamber is an immense box or room of lead, bound together with a strong framework of timber, and generally raised on arches several ft. above the ground. Chambers vary in size from 60 to 140 ft. in length, and from 20 to 40 ft. in width and height. Curtains of lead proceeding alternately from the bottom to near the top, and *vice versâ*, are very frequently used; they serve to retard the progress of the gases, and thus insure the transformations desired. The floor of the chamber is covered with water, into which the S. A. falls as it is formed; and when this solution attains a certain strength, it is tapped off for concentration. The nitrous compounds are recovered as in the case of S. A. produced from pyrites, by means of a tower filled with coke, E, down which a constant stream of strong sulphuric acid trickles, the acid absorbing the nitrous fumes in their way upward. Instead of a single chamber, curtained off or not as the case may be, sometimes three or five distinct chambers, connected by pipes, are employed, those communicating directly with burners being termed working chambers, and the others receiving chambers—the last either acting as or communicating with a condenser or chimney.

The manufacture of S. A. is an extensive industry; immense quantities being consumed in manufacture of soda and of bleaching-powder, in calico-printing and deying, and in most chemical operations in the manufactory and the laboratory. See Lunge's *Manufacture of S. A. and the Alkalies* (3 vols. 1879–81).

SULPHU'RIC ANHY'DRIDE, formerly known as ANHYDROUS SULPHURIC ACID (SO_3): a colorless crystalline solid, which is tough and ductile, and can be molded in the fingers like wax without injuring the skin. It liquefies at 65°, and boils at about 112°, forming a transparent vapor, if hot water be present. It unites with moisture when exposed to the air, and gives off dense white fumes. When thrown into water, the heat emitted is so great that it hisses as red-hot iron would do; and the solution has all the properties of ordinary sulphuric acid. It may be obtained by distillation of fuming Nordhausen acid, when white fumes pass over in the cooled receiver, and solidify into a white silky-looking fibrous mass. It combines with sulphur, iodine, and hydrochloric acid; but both it and its compounds are of chemical interest rather than practical value: see CHEMISTRY.

SULPHU'RIC E'THER: term commonly but improperly applied to ethylic, vinic, or ordinary Ether (q.v.). True *sulphuric ether*, known also as *sulphate of ethyl*, $(C_2H_5)_2SO_4$, is an oily liquid, of burning taste and ethereal odor, resembling that of peppermint, of specific gravity 1·120 (while that of ordinary pure ether is 0·720); and almost incapable of being distilled without decomposition, as at a temperature of about 280° it resolves itself into alcohol, sulphurous acid, and olefiant gas.

For the anæsthetic properties of S. E., see ETHER. Local insensibility may be readily induced by application to the skin of the finely divided spray of perfectly pure rectified ether, of specific gravity 0·723. The skin blanches in from half a minute to two minutes; and by following the knife with the spray, more than merely superficial incisions may be rendered painless. It has been successfully employed in amputations of fingers and toes, removal of tumors, opening of abscesses, removal of teeth, etc.

SUL'PHUR SPRINGS: town, cap. of Hopkins co., Tex.; on the Missouri Kansas and Texas and the St. Louis Arkansas and Texas railroads; 80 m. e.-by-n. of Dallas, 93 m. n.w. of Jefferson. It is in an agricultural region; has several cotton-gins and flour-mills, iron foundry, carriage factory, and sash, door, and blind factory; and contains 5 churches, high school, graded school, 2 national banks (cap. $200,000), and 3 weekly newspapers. S. has several sulphur springs and a large trade with the surrounding region. Pop. (1890) 3,038; (1890) 3,635.

SULTAN, n. *sŭl'tăn* [Ar. *sultan*, victorious, also prince, king]: emperor of the Turks, who assumes the title Sultan of Sultans, the padisha or grand seignior: in general, a Mohammedan prince. In Turkish the title S. has no grammatical gender, and is applied (corresponding with Eng. *princess*) to the mother or to the daughters of the Sultan—the Eng. term being Sultana. SULTANA, n. *sŭl-tâ'nă* [It.], or SULTANESS, n. *sŭl'tă-nès*, mother or daughter or consort of a sultan. SULTA'NA, a. a small and fine variety of raisin. SUL'TANSHIP, n. office or dignity of a sultan.

SULTRY, a. *sŭl'trĭ* [Dut. *zwoel;* Ger. *schwül*, suffocating with heat: AS. *swelan*, to burn: OHG. *suelen*, to dry up: Icel. *svala*, thick smoke]: oppressively hot; very hot and close. SUL'TRINESS, n. the state of being hot and close.

SULU, *sô-lô'*, ISLANDS: archipelago of the Philippines, S. of Mindorao; ceded to the U. S. by Spain, 1898. It comprises 188 islands, and 1,028 sq. m.; pop. 23,000. Sulu, chief of the islands, contains the residence of the sultan. See PHILIPPINE ISLANDS.

SUM, n. *sŭm* [Norm. F. *summe;* F. *somme*, sum—from L. *summa*, the amount]: that which two or more numbers, quantities, or particulars form when added or placed together; the amount or whole of anything; the total; a quantity of money; the substance; an abridgment; height; completion; a problem in arithmetic: V. to collect or add into one whole, as particulars or several numbers; to bring into a small compass; to compute; to comprise; to collect

into a narrow compass; to condense, as a speech; in *OE.*, in *falconry*, to have feathers full-grown. SUM'LESS, a. *-lĕs*, in *OE.*, not to be computed. SUM'MING, imp. SUMMED, pp. *sŭmd.* SUMMARY, n. *sŭm'mĕr-ĭ*, an abstract; an abridgment: ADJ. containing the substance; reduced into a small compass; short; concise; effected by a short way or method. SUM'MARILY, ad. *-lĭ*, shortly. SUMMATION, n. *sŭm-mā'shŭn*, the act of forming a sum or total amount; an aggregate. SUMMARY CONVICTION, in *law*, a conviction without assistance of a jury (see SUMMARY JURISDICTION). SUMMARY DILIGENCE, in *Scotch law*, issuing of an execution without the formality of an action. SUM-TOTAL, n., SUMS-TOTAL, plu., the whole amount of several totals added together. TO SUM UP, to add up; to state the chief points in an argument; to review evidence, as by a judge. SUMMING UP, a judge's charge to a jury in which he reviews the evidence.—SYN. of 'summary, a.': short; concise; compendious; succinct; cursory; prompt.

SUMACH, n. *sū mŭk* [F. *sumac;* Sp. *zumaque*, sumach: Ar. *summak*], (*Rhus*): genus of small trees and shrubs, of nat. order *Anacardiaceæ;* having small inconspicuous flowers in panicles or in corymbs; a 5-parted calyx, 5 petals, springing from beneath a large orbicular disk; 5 stamens; a 1-celled germen with 3 stigmas; the fruit a small, nearly dry drupe, with bony *putamen*. The species are numerous. —VENETIAN S. (*R. cotinus*), known also as Wig S. or Wig Tree, and, in American cultivation as the Smoke-tree, native of s. Europe and w. Asia, is often planted in western countries as an ornamental shrub. It has simple leaves, and hairy corymbs of fruit, which have a sort of resemblance to periwigs. The wood dyes yellow; and, with the addition of other substances, dyes green and brown; it is known in trade as *Young Fustic*. It is largely exported. The bark is sometimes used as substitute for Peruvian Bark. The leaves are astringent, and are used in dyeing Turkey Red. The root also is used in dyeing; and the whole plant is used in Italy for tanning, and is there called *Scotino*. The seed resembles the almond in flavor.—The very acid fruit of the ELM-LEAVED S. (*R. coriaria*)—native of the countries around the Mediterranean, with pinnate leaves—has been used from the earliest times, as it still is by the Turks and Persians, as a condiment. The seeds and leaves are used medicinally, in s. Europe and in the East, as tonic and cooling. This species is extensively used for tanning, particularly in Turkey and in Spain. The leaves and twigs are used for dyeing black, the roots and fruit for dyeing red, and the bark for dyeing yellow.—Similar in properties and uses is the VIRGINIAN S. or STAG-HORN S. (*R. typhina*), native of almost all parts of N. America, and common in British shrubberies, which has the branches curiously crooked, and covered, when young, with soft velvety down. It has pinnate leaves, with numerous leaflets.—The SMOOTH-LEAVED S. (*R. glabra*), a very similar species, also N. Amer., has acid leaves and fruit. This species is sometimes troublesome, overrunning ground.—Of acrid and poisonous species most important is the POISON IVY or

POISON OAK (*R. toxicodendron*) of N. America. Poison Ivy does not affect all persons injuriously. It may be readily distinguished by the variety of its three leaflets, some of which are entire, others notched, sinuate or deeply lobed, on one side or both; also by the abundant rootlets by which it is attached to trees or posts, from which the branches often stand out horizontally. Chance individuals with the leaves not irregular were formerly named *R. radicans*. The POISON-DOGWOOD, or Poison-elder (*R. venenata*), is still more dangerous to touch, and, in the case of some persons, even to approach. It produces inflammation of the skin, with pustules and itching. It is a shrub 6–18 ft. high, the stem ashy gray, the young shoots purplish, the 7–13 obovate entire leaflets with a habit of standing somewhat erect. Both of these poisonous species may be recognized further by their smooth globular pale blue or greenish white, or dun-colored berries, in loose clusters in axils of the leaves; of the poisonous species only *R. metopium* of Fla. has red berries. The poison was formerly supposed a property of the juice, but is now said to be due to myriads of a species of microbe which abounds in the juice and on the surface of the plants, and has power to thrive in human flesh, though carried from one part of the body to another by the finger-nails in scratching. Lime water, or some wash or ointment containing a mineral poison or other germicide, is used in external applications. The names Ivy, Elder, Dogwood, applied to these plants, are very misleading. The innocent Flowering Dogwood, with large white flowers (involucre), and the Virginia creeper, by some called American Ivy, with 5 radiating leaflets, belong to other families.—Of the harmless sumachs, there are the Fragrant S. (*R. aromatica*), from Vt. to the w. and s., shrub, with leaves like Poison Ivy, but the flowers like catkins, appearing before the leaves; the Dwarf S. (*R. copallina*), like *R. glabra*, but downy, and the leaf-stalks with wing-margins; *R. pumilla* of N. C. and Ga., dwarf, with reclining stems; and *R. cotinoides* of Ala., with plumose pedicels like the Smoke-tree or Venetian S. (*R. cotinus*).—The boiled berries of *R. succedaneum* of Japan yield a superior wax for candles; many species are used for tanning thin leather; with precautions, a varnish, like that from the Japanese species, could be prepared from our Poison S., the juice of which and of the Poison Ivy turns black; and the bark of our common Smooth S. is a mordant for red, and has been used as a febrifuge, as also the roots of the Stag-horn Sumach.—The VARNISH S., or JAPAN VARNISH TREE (*R. vernicifera*), native of Japan and Nepaul, yields a varnish much used in Japan for lacquer-work: this varnish is the juice which flows from wounds in the tree, and becomes thick and black by exposure to the air, but is still so transparent that the finest veins of wood remain visible through it. It is sometimes mixed with coloring matters, sometimes with gold-leaf finely ground.

The name TANNERS' S. is given to *Coriaria myrtifolia*, shrub of s. Europe, of nat. order *Ochnaceæ:* the leaves are astringent, and are used for tanning, and for dyeing black,

SUMAGE, or SUMMAGE, n *sŭm'ĭj* [F. *sommier*, a pack-horse]: toll for carriage on horseback; a horse-load.

SUMATRA, *sô-mä'tra* (called by the Arabians *Srimat* or *Srimata*, 'the happy,' whence its present name): most westerly of the Sunda Islands, and one of the largest and most important of the E. Indian archipelago; s. of the Malay Peninsula, from which it is separated by the Strait of Malacca: lat. 5° 40′ n.—5° 59′ s.; 1,047 m. long, and about 230 m. in extreme breadth; estimated 170,744 sq. m. Pop., including the adjacent isles, prob. about 5,000,000, two-thirds directly or indirectly under Netherlands rule. The Europeans number about 3,000, without the army in Atcheen (see PADANG).

Physical Features.—The Barisan Mountains traverse its entire length, varying in height from 1,550 ft. in the s.w. to 6,000 under the equator. Lofty cones, about 20 being volcanoes, rise 6,000 to more than 10,000 ft. Another series of mountains runs parallel with the Barisan, lofty plateaus of great extent linking the two at various points. On the w. coast, a few miles of low land lie between the mountains and the sea, and in some parts spurs reach the shore in beetling cliffs. Wide alluvial plains, covered with dense jungle and forest, through which the rivers flow sluggishly, forming deltas at their mouths, stretch along the n.e. coast: while the tidal action is eating into the w. coast, new ground is forming on the east.

Extensive valleys lie between the mountain chains. Several beautiful lakes are in the interior. The largest is Lake Singkarah or Samawang, in Upper Padang, 17 m. long and 6 broad; 1,167 ft. above sea-level: it discharges its waters by the Ombilin, which, flowing toward the e. coast, becomes the Indragiri.

The mountain systems are of trachyte, granite, limestone, red sandstone, and a widespread conglomerate of granitic and quartzose particles, the hollows in many places being filled with lava. Sienite, porphyry, serpentine, jasper, basalt, and tufa occur. Tertiary deposits are found in the valleys; and on parts of the coasts rich vegetable mold rests on beds of red and gray clay, or on coralline limestone. Potter's clays are found and gold is widely diffused. Coal, iron-ore, copper, sulphur, lead, silver, saltpetre, alum, naphtha, etc., abound.

Rivers.—S. has many rivers: the most important are the Tūlang-Bawang; the Mūsi, or river of Palembang; the Djambi, Indragiri, and Siak, on the e.; the Singkel, Tabū-jong, Indrapūra, Moko-Moko, Bencoolen, and Padang Gūtjie on the w. Capes and bays are numerous, and the Bay of Tapanūli is capable of containing a large fleet. A chain of islands lies parallel to S. in the Indian Sea: the most important are—Babi or Si Malu, Nias (q.v.), the Batū Islands, N. Pora, Coco Island, S. Pora, N. Pagei, and S. Pagei. S.e. lies Banca, rich in tin; producing also iron, lead, silver, copper, arsenic, and amber.

Climate.—The climate is moderately healthful, especially on the e. coast. In Tapanūli, however, are large marshes, inducing intermittent and typhoidal fevers, dysentery, and

other diseases. A slight increase of temperature occurs from Oct. to March, the minimum being in May. Except in the highlands of the interior, where it is cool, the thermometer ranges from 70° F. at sunrise to 94° at 2 P.M. The monsoons are irregular, and rain falls during all the months, though the quantity in Oct. and Dec. is double that in February and June.

Flora.—S. has many fine species of timber-trees—as the Djati (*Tectona grandis*), the Maris, a hard and heavy wood, ebony, iron-wood, etc. The magnificent *Dryobalanops camphora*, and other resin-producing trees, abound. Several species of fig, the *Urceola elastica*, from which caoutchouc is obtained, and the gutta-percha tree (*Isonandra gutta*), are numerous. In the villages, the Bombax, or silk-cotton tree, forms a shady resting-place. The lovely *Cinnamomum cassia*, the *Melaleuca leucadendron*, which yields the medicinal cajeput oil, the satin-wood (*Chloroxylon swietenia*), the gigantic reed (*Calamus draco*), from whose ripe fruit the dragon-blood gum exudes, and a great variety of palms, form part of the botanical wealth of the island. Flowering plants and shrubs are numerous, and countless parasites garland the forest trees with flowers of every hue. The most curious of these is the *Rafflesia* (q.v.), which, clinging to the bark of large trees, spreads out the largest known flower, with a calyx 3 ft. in diameter and 9 inches deep, and capable of containing 2 gallons of fluid.

The fruits are richer in flavor than those of Java: among them are the guava, citron, orange, lemon, durian, mango, bread-fruit, cocoa-nut, pomegranate, water-melons, pineapples, and the highly-prized mangosteen, or berry of *Garcinia mangostana*. Cacao, cotton, maize, indigo, tobacco, gambier, and especially rice, millet, pepper, and coffee, are cultivated.

Fauna.—The elephant, single and double-horned rhinoceros, tiger, leopard, black bear and tiger cat, wild swine, tapirs, antelopes, deer, monkeys (including the ourang-outang), ant-eaters, many kinds of bat, etc., abound. Buffaloes, cows, goats, horses, sheep, and swine are kept by the natives. The peacock and the pheasants of S. are of rare beauty. Hippopotami and crocodiles frequent the rivers, which have many kinds of fish, including a species of salmon.

Geographical and Political Divisions.—The kingdom of Atcheen (q.v.), Acheen, or *Achin*, occupies the n.w. portion of the island (extending farther s. on the e. coast than on the w.); area, 20,000 sq. m.; pop. (1882) about 480,000. The Dutch began 1873 a tedious war for subjugation of the country, which 1878 was proclaimed a Dutch govt. It is well cultivated, and produces much pepper. Singkel, Tapanūli, and Lower Padang, administratively under the presidency of Padang (q.v.), lie in succession s.e. of Acheen. Bencoolen (q.v.) stretches along the w. coast from 101° to 104° 40′ e. long.; and the extreme s. and the e. coast, 4° 4′—5° 56′ s. lat., form the Lampong districts. N. of these is the residency of Palembang (q.v.), with the kingdom of

Djambi, ruled by a native prince under Dutch control. Farther n. are Indragiri, Kampar, and Siak, governed as Djambi. Between Siak and Acheen are many petty states.

People.—The natives are chiefly Malays who profess Mohammedanism. In appearance, manners, and customs, however, the inhabitants of Acheen and the Lampongs differ widely from those of other parts. The Acheenese are tall, well made, active, and intelligent, but cunning, proud, treacherous, and blood-thirsty. They live simply, but are slaves to opium. The Lampongers are of middle stature, well formed, of pleasant exterior, mild, but uncivilized and lazy. Caste prevails, and they follow the usages of their fathers, Mohammedanism being imperfectly known and practiced. Polygamy obtains, the wives being bought from their relatives. The houses are on posts of iron-wood, and several families live under the same roof. In other parts of S. the usual Malay type is found. The Kūbūs, in n.w. Palembang, are probably the remnant of the aborigines, a harmless race living chiefly by the chase and fishing: theft and murder are scarcely known among them; and they believe in a future spirit-life. The Battas (q.v.) or Bataks, a notable semi-savage people, live in the region s.e. of Acheen.

Trade and Produce.—The imports and exports of the independent and half-independent kingdoms cannot be ascertained. Acheen alone produces 8,000 tons of pepper annually; also exports gold, precious stones, cotton, raw silk, sapan-wood, benzoin, camphor, sulphur, betel, etc., to w. India by way of Pūlū Penang and Singapore, receiving in return manufactured goods, salt, opium, etc. On the s.w. coast, Bencoolen, the Lampongs, and Palembang, imports have annual value of about $3,750,000; exports about $4,200,000. Java has nearly half the trade, Europe and eastern countries the remainder. Imports—rice, cotton and other textile fabrics, etc.; exports—benzoin, gum elastic, resin, pepper, rattans, cotton, coffee, drugs, ivory, dye-stuffs, edible nests, wax, tobacco, bêche-de-mer, etc. The rice-culture is extensive, the w. coast producing as much as 320,000 tons a year. For the foreign market coffee is the most important crop; the yield varies from 5,500 tons to nearly twice as much. Upper Padang sends the largest quantity of coffee and rice, with much cocoa-nut oil, to market: in three years (1880–82) the average annual value of coffee brought to market in Padang was about $600,000.

History.—Marco Polo visited S. in the 13th c., Alvaro Talezo 1506, and Siquera 1509—the Portuguese then entering into trading relations with the natives. About 90 years later, the Dutch under Houtman reached the island; and on a second visit he was treacherously murdered at Acheen. In 1601, two ships from Zeeland, with the Netherlands commissioners, Gen. De Roi and Laurens Bikker, arrived, were favorably received by the king, obtained a full cargo, and returned with two Acheenese ambassadors. Later, the Dutch drove the Portuguese from their factory at Pūlū Tiinko, s. of Padang; and 1666

the latter place became the seat of the Netherlands power on the w. coast. In 1795 Padang was taken by the British and retained till 1819. A few years afterward Bencoolen also was given up to the Dutch, and the s. division of the island soon fell under the same rule. Various rebellions against the Netherlands dominion have since arisen, with the uniform result of extending the Dutch power toward the interior and the north. The appalling eruption of 1883 at the volcanic island of Krakatoa, between S. and Java, raised a vast sea-wave which swept destructively the s. shore of S., and raised a new line of volcanic cones in the Straits of Sunda.—See the work, *Nederlandsch Indie*, by Nijhoff; *The Malay Archipelago*, by A. R. Wallace (1869); *Australasia*, by A. R. Wallace (1880).

SUMBAWA, *sŏm-bâ'wâ* or *-baw'*, or SAMBAWA, *sâm-bâ'wâ:* one of the chain of islands e. of Java, in the E. Indian archipelago, and of the Sunda group; 8° 4′—9° 2′ s. lat., and 116° 50′—119° 15′ e. long.; estimated area 5,186 sq. m.; estimated pop. (1887) 150,000. S. is now divided into the kingdoms of Sumbawa, Bima, Dompo, and Sangar, each governed by its own sovereign. The island is mountainous, but except the volcano Tambora, 9,522 ft., the elevation does not exceed 5,560. The most valuable timber-tree is the Djati (*Tectona grandis*, or Indian teak), and the tamarind is so abundant as to be little valued. Rice is extensively grown. Sapan-wood is contracted for with the chiefs or kings, by the Netherlands colonial govt.—The natives are of the Malay race, but speak three different languages. They are inoffensive and industrious—murder, robbery, and theft said to be almost unknown. Many are Mohammedan; but the mountaineers are chiefly heathen, with an idea of a supreme being. Ancient relics found in Bima indicate that they were formerly believers in Hinduism.

In 1815 an eruption of Tambora depopulated the kingdoms of Tambora and Papekat, 12,000 lives being lost, and great damage done to the whole island by the ashes. Another eruption occurred 1836, and one of Gunong Api, in Bima, 1860; but with little loss.

SUMBUL, n. *sŭm'bŏl* [Tartar word]: root of a plant brought from the East, *Euryan'gĭum sumbul*, ord. *Umbellĭf ĕræ;* used in medicine as a stimulant in epilepsy, hysteria, and other diseases of the nervous system. It may be given in the form of infusion, tincture, or resin. It has a musk-like odor and an aromatic and bitter taste: see MUSK PLANT.

SUMMAR ROLL, *sŭm'mĕr:* in *Scot.*, court of session procedure, a contraction of SUMMARY ROLL.

SUM'MARY JURISDIC'TION: power granted to justices of the peace to hear and determine criminal cases without intervention of a jury. The S. J. Act was an Eng. statute of 1848 to expedite proceedings in criminal cases before justices of the peace: its provisions were extended to Ireland 1871 and to Scotland 1881. In the United States the federal constitution guarantees the right of jury trial in all criminal trials except impeachments.

SUMMARY, SUMMATION, SUMMING: see SUM.

SUMMER, n. *sŭm'mĕr* [Ger. *sommer;* Dan. *sommer;* Ice. *sumar;* Gael. *samhradh*, summer]: the warmest season of the year; one of the four seasons; that which follows the spring: V. to pass the summer; to carry through the summer. SUM'MERING, imp. SUM'MERED, pp. *-mĕrd.* INDIAN SUM'MER, in *N. Amer.*, a brief period of pleasant warm weather late in autumn. SUMMER-HOUSE, a house or apartment formed in a garden for use in summer; a residence for summer. SUMMER SOLSTICE, with reference to the northern hemisphere, that period of the year when the sun attains his most northern point, about June 22.

SUMMER, n. *sŭm'mĕr* [OF. *sommier*, a sumpter-horse, a summer—from mid. L. *salma;* L. *sagma*, a pack—from Gr. *sagma*, a pack-saddle—from *sattein*, to pack]: in *arch.*, the first stone laid over columns to form a cross-vault; the central beam of a floor; a horizontal beam or girder in the front of a building—called also Breast-summer or Brest-summer (q.v.). BRES'SOMER is the breast-summer or front beam of a house.

SUMMER DUCK, or WOOD DUCK (*Aix sponsa*): the most beautiful of our ducks, and the only one breeding in hollow trees. It prefers inland creeks and ponds, and ranges through N. America. The front, crown, and drooping crest are iridescent green and purple, with lines of white; breast dark violet brown, with triangular white spots; sides with fine undulating lines, back bronze and green; wing-coverts violet blue; tail-coverts a fine pendulous fringe; and many markings of white and black; iris and part of the bill red. The female has much brown and is but slightly crested. The S. D. has been domesticated; the eggs are in size $2\frac{1}{8} \times 1\frac{1}{2}$ in., of color and polish like old ivory. It winters, sometimes, as far n. as Virginia and (it is said) New England.—Very similar is the MANDARIN DUCK (*Dendronessa* or *Aix galericulata*), a Chinese species. Both these species have the power of perching on trees. The S. D. makes its nest in the hollow of a tree.

SUMMERFIELD, *sŭm'mĕr-fēld*, JOHN: pulpit orator: 1798, Jan. 31—1825, Jan. 13; b. Preston, England. Educated in a Moravian school, with reference to the ministry, he became dissipated, and continued so after his family removed to Dublin, but was converted 1817, and joined the Wesleyans, to which connection his father belonged. He became a preacher two years afterward, and his eloquence drew large crowds in Dublin, and also in America, to which he came with his father 1821. His eloquence was fervid, chaste, and genuine, attracting hearers of all conditions. After visiting Philadelphia and other cities, he went to France 1822 for his health, and as delegate of the Amer. Bible Soc., thence to England, returning to New York 1824, and continuing to preach so far as his ill health permitted. He was one of the founders of the Amer. Tract Soc. He died in New York. A volume of his *Sermons and Sketches of Sermons* was issued; and his biography by John Holland (1829).

SUM'MER ISLANDS: small archipelago of about 20 islets off the w. coast of Scotland, near the entrance of Loch Broom, an inlet in the n.w. of the county of Ross. The largest islet is Tanera, 2 m. long, 1 m. broad.

SUMMERS, *sŭm'mĕrz*, THOMAS OSMOND, D.D., LL.D., Methodist Episc. theologian: b. Dorsetshire, England, 1812: Oct. 11. He came to this country 1830, became preacher 1834, was appointed to the Augusta circuit 1835, travelling much and preaching almost daily. In 1840, he was one of the few who organized the first Texas conference. Joining the Ala. conference 1844, he participated in forming the Meth. Episc. Church, South, assisted in editing the *Southern Christian Advocate* and a new hymnal, and subsequently was official editor of the publications of his communion and of the *Quarterly Review*. During the civil war, he engaged in pastoral work south, and in 1874 was elected prof. of systematic theol. in Vanderbilt University. His principal publications are: *A Treatise on Baptism; A Treatise on Holiness; Commentary on the Gospels and the Book of Acts; The Sunday-School Teacher; Seasons, Months, and Days; Scripture Catechism; Refutation of Thomas Paine's Writings;* revision of *Watson's Biblical and Theol. Dic.;* also, *Commentary on the Ritual of the Meth. Episc. Church, South.*

SUMMERSAULT, n. *sŭm'mĕr-sawlt*, or SUM'MERSET, *-sĕt* [a corruption of F. *soubresaut*, a gambol]: other spellings of SOMERSAULT and SOMERSET: see SOMERSAULT.

SUMMIST, n *sŭm'ĭst* [eccles. L. *summista*]: one who forms an abridgment or summary; summarist. In *chh. hist.*, name given to the scholastic divines of the Middle ages, who propounded their dogmas in works called *Summæ Theologiæ:* the leaders among these were Alexander of Hales (q.v.), Albert, Count of Böllstadt (q.v.), and Thomas Aquinas (see AQUINAS, THOMAS).

SUMMIT, n. *sŭm'mĭt* [F. *sommet*, a summit—from L. *summus*, highest, topmost]: the highest point; highest degree; the top; utmost elevation. SUM'MITLESS, a. *-lĕs*, having no top.

SUMMON, v. *sŭm'mŭn* [OF. *somoner;* F. *semondre*, to invite, to warn; *semonneur*, a summoner—from L. *summonĕrĕ*, to remind, to give a hint—from *sub*, under; *monĕō*, I warn]: to call by authority to appear at a place specified; to give notice to appear in court; to cite; to excite, with *up*, as to *summon up* courage. SUM'MONING, imp. SUM'MONED, pp. *-mŭnd.* SUM'MONER, n. *-mŭn-ĕr*, one who summons. SUM'MONS, n. *-mŭnz* [F. *semonce*, a warning, citation]: a call by authority to appear at some particular place or in a court; the written or printed document by which such call is given; a call or invitation to surrender.—SYN. of 'summon': to call; cite; notify; convoke; convene; invite; bid; excite.

SUM'MONS, in Law: generally a writ directed to a party to appear and answer some complaint before a court or judge. It is the first writ in an action at law; and a similar writ issues incidentally both in chancery and in interlocutory matters: it is also the first step in proceedings before justices.

SUMNER, *sŭm'nĕr*, CHARLES: statesman and orator: 1811, Jan. 6—1874, Mar. 11; b. Boston; son of Charles Pinckney S. (lawyer and high sheriff of Suffolk co.), and grandson of Maj. Job S. of the revolutionary army. He prepared for college in the Boston Latin School; graduated at Harvard 1830; took the course in the Law School there; began practice in Boston 1834 with great success; and as reporter of the U. S. circuit court published 3 vols. of reports, at the same time editing the *American Jurist*, and delivering lectures in the Harvard Law School 1835–37 and 1843, having charge of the school in Judge Story's absences, but declining the offer of a professorship. He travelled in Europe 1837–40. His public life may be dated from 1845, July 4, when, at invitation of the Boston city authorities, he gave his famous oration on *The True Grandeur of Nations*, a plea for peace by international arbitration, suggested by the prospect of war with Mexico; six editions of this were republished in England, exciting much discussion of the principle enforced, that the ordeal of battle is no less a barbarous relic of the past as between nations than it was in its former application as between individuals. Other addresses following were: a Faneuil Hall speech against the annexation of Texas (1845); *The Scholar, the Jurist, the Artist, the Philanthropist* (1846); a whig state convention address on *The Anti-Slavery Duties of the Whig Party* (1846); *Fame and Glory* (1847); *White Slavery in the Barbary States* (1847; in vol. form 1853); *Law of Human Progress* (1848); and *The War System of the Commonwealth of Nations* (1849). In 1850 he was elected U. S. senator by a combination of free-soil men and democrats, to fill the place of Daniel Webster, who had entered Pres. Fillmore's cabinet. His first speech in the senate was in debate on a welcome to Kossuth; and his first notable one was *Freedom National, Slavery Sectional*, on motion to repeal the fugitive slave bill (1852). Occasional addresses at this period were: *Finger Point from Plymouth Rock* (1853); *Landmarks of Freedom* (1854); *The Anti-Slavery Enterprise* (1855), etc. His great speech in the senate followed: *The Crime against Kansas* (1856, May 19–20), the fearlessness of which, and especially a rejoinder to Senator Butler of S. C., led a relative of the latter, Representative Preston S. Brooks, to make a murderous assault (on the 22d) on Sumner, who was seated at his desk, writing, after adjournment of the senate. After three years of severe suffering, Sumner recovered, and delivered in the senate his befitting, intrepid, and magnificent speech on *The Barbarism of Slavery* (1860). During the war, he opposed compromise and was one of the foremost to urge emancipation, e.g., in his speech on *Slavery and the Rebellion One and Inseparable* (1864). From 1872 his health was feeble. He became embittered

against Pres. Grant's administration, and opposed his re-election 1872, and favored Greeley's nomination after it had been made. At this period his most noted speeches were on finance, and on questions cognate to his chairmanship of the committee on foreign relations. His last, 1874, Jan. 27, was in advocacy of his Civil Rights Bill, which, after his death, was passed in amended form. He died in Washington. In person, character, principles, ability, scholarship, and manner, he bore a stamp of nobility.—As an orator, S. was massive and powerful in matter and manner—dealing with large subjects in a mode of thoroughness and elaboration appropriate rather to senatorial debate than to rapid and incisive popular discussion.—Besides previous collections, his complete works were pub. 8 vols. (1870).

SUM'NER, Edwin Vose: 1797, Jan. 30—1863, Mar. 31; b. Boston: milit. officer. He received an academical education; entered the U. S. army as 2d lieut. of inf. 1819; served in the Black Hawk war; was promoted capt. 2d dragoons 1833; on duty in the Indian country several years; and became supt. of the school for cav. practice 1838. In 1846 he was promoted maj.; and 1847 led the cav. charge at Cerro Gordo, commanded the reserves at Contreras and Churubusco, and with his cav. checked 5,000 Mexican lancers at Molino del Rey. He was gov. of N. Mex. 1851-53; studied European cav. 1853-55; promoted col. 1st cav. 1855; and commanded the dept. of the west 1858. In 1861, Mar., he was promoted brig.gen.; in the Va. peninsular campaign 1862 commanded the 1st corps, Army of the Potomac, and was twice wounded; 1862, July, was made maj.gen. vols., and commanded the 2d corps and one of the grand divisions at Fredericksburg; and died while about to take command of the dept. of the Missouri.

SUM'NER, John Bird, D.D.: Archbishop of Canterbury: 1780-1862, Sep. 6; b. Kenilworth, England. He studied at Eton and Cambridge; was canon of Durham 1820, and bp. of Chester 1828; and abp. of Canterbury 1848. He was efficient in promoting schools and churches, and was the leader of the low-church section of the establishment, especially during the controversies on ritualism and the higher criticism. Among his writings were: *Apostolical Preaching* (1815); *The Records of the Creation* --prize essay (1816); *Evidences of Christianity* (1824); *Practical Reflections*—a book of selections (1859). He was eminent for piety and intellectual force, and was an accomplished writer.

SUM'NER, William Graham: author and Yale prof. of polit. economy: b. Paterson, N. J., 1840, Oct. 30. After graduation at Yale, and several years of study at Göttingen and Oxford, he returned to be tutor 1866. He was ordained deacon in the Prot. Episc. Church 1867, and assisted in Calvary Church, New York. Since 1872 he has been prof. of polit. economy and social science at Yale. In finance, he advocates the gold standard. Of the two general schools of economics, he belongs to that which

teaches the potency of natural laws and distrusts governmental interference, and, as a consequence, he is an advocate of free trade—treating that topic with wide research and great cogency of argument. Among his publications are: *American Finance* (1874), in Transactions of the Amer. Social Science Assoc.; *History of Amer. Currency* (1874); *Lectures on the Hist. of Protection in the United States* (1875); *Life of Andrew Jackson* (1882); *What the Social Classes Owe to Each Other* (1883); *Economic Problems* (1884); *Essays on Polit. Science* (1885); *Protectionism* (1885); *Alexander Hamilton* (1890), in the 'Makers of America' series of biographies; *The Financier and the Finances of the Amer. Revolution*, 2 vols. (1891).

SUMP, n. *sŭmp* [Dan. and Sw. *sump;* Dut. *somp;* Ger. *sumpf*, a swamp, a marsh]: an excavation at the bottom of a mine where the water accumulates, and from which it is pumped; a round pit of stone lined with clay for receiving metal on its first fusion; in *salt-works*, the pond into which the sea-water is pumped for future use.

SUMPTER, n. *sŭm'tĕr* [F. *sommier;* It. *somaro*, a pack-horse—from L. *sagma;* Gr. *sagma*, the load of a beast—from *sattein*, to pack]: an animal which carries baggage; a baggage horse or mule; used as the first part of a compound, as *sumpter*-horse.

SUMPTUARY, a. *sŭm'tū-ĕr-ĭ* [L. *sumptŭārĭus*, of or relating to expense—from *sumptus*, expense, cost; *sumĕrĕ*, to spend: F. *somptuaire*, sumptuary]: relating to expense; regulating the cost of living. SUMP'TUOUS, a. *-ŭs* [F. *somptueux;* L. *sumptŭōsus*]: costly; expensive; magnificent; splendid; princely. SUMP'TUOUSLY, ad. *-lĭ*. SUMP'TUOUSNESS, n. *-nĕs*, the state of being sumptuous; costliness; expensiveness.

SUMP'TUARY LAWS: laws to prevent extravagance in banquets, dress, and private expenditure. They abound in ancient legislation. The Locrian legislator Zaleucus, B.C. 450, ordained that no woman should appear in the streets attended by more than one maid-servant, unless she were drunk; or should wear gold or embroidered apparel, unless she designed to act unchastely. At an early period in Roman history, the censors, to whom was intrusted the superintendence of public and private morality, punished with the *notatio censoria* all persons guilty of luxurious living; but as luxury grew with wealth and foreign conquest, legislative enactments were passed to restrain it. The Lex Orchia, B.C. 161, limited the number of guests at a feast; the Lex Fannia, B.C. 161, enacted that the utmost sum expended on certain festivals was to be 100 ases, 30 ases on certain other festivals, and 10 ases on an ordinary entertainment, where also no other fowl than one hen was permitted to be served up, and that not fattened for the purpose. These and other laws seem to have been disregarded in the later times of the republic.

Sumptuary laws were in favor in the legislation of England from the time of Edward III. till the Reformation Statute 10 Edward III. c. 3 narrates the 'many mischiefs'

which have happened 'through the excessive and overmany costly meats which the people of this realm have used more than elsewhere;' and enacts that no man, of whatever condition or estate, shall be allowed more than two courses at dinner or supper, or more than two kinds of food in each course, except on the principal festivals of the year, when three courses at the utmost are to be allowed. All who did not enjoy a free estate of £100 per annum were prohibited from wearing furs, skins, or silk, and the use of foreign cloth was allowed to the royal family alone. Act 37 Edward III. prescribes the apparel of the various classes of people, with minute regulations for the clothing of women and children. In France there were sumptuary laws as old as Charlemagne, prohibiting or taxing the use of furs. By an edict of Charles VI., no one was allowed to exceed a soup and two dishes at dinner. Sumptuary laws were enacted in England in the 16th, and in France as late as the 17th c. The Scottish parliament attempted to regulate the dress of the ladies, to save the purses of the 'puir gentlemen their husbands and fathers;' and there was a general prohibition of superfluous banqueting and inordinate use of expensive foreign spices. These laws were not anywhere practically observed to any great extent. All sumptuary laws have long been considered opposed to true political economy, though a few remained on the English statute-book as late as 1856.

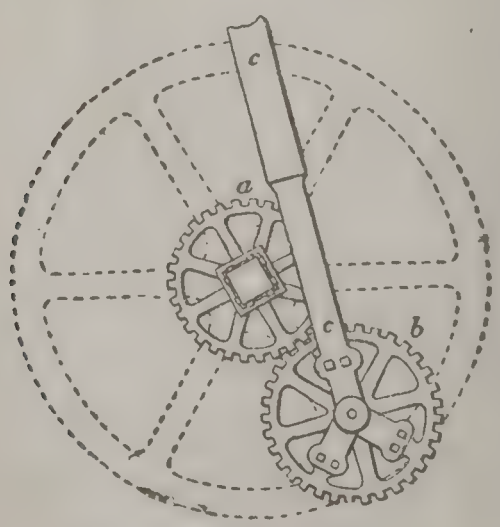
SUM'TER, Fort: noted defensive work of the second class, on an artificial island on the s. side of the entrance to the inner harbor of Charleston, S. C., 1 m. s.w. of Fort Moultrie (see Moultrie, Fort), 3½ m. s.e. of Charleston. It was named from the distinguished revolutionary soldier, Gen. Sumter (q.v.). Its erection was begun 1829, and the walls were reared of brick on a foundation of riprap, with an extreme height of 38 ft. above high water and a uniform thickness of 7½ ft. It was planned to accommodate 156 guns in three tiers, the first and second in embrasure, the third *en barbette;* but the second embrasure tier was never completed. At the outbreak of the civil war it mounted 78 guns, 24-pounders, 32-pounders, 42-pounders, Rodmans, Columbiads, and seacoast howitzers, and had cost more than $1,000,000. Because of the unfinished condition of Fort S. (1860) the small U. S. garrison under Maj. Anderson (q.v.) was occupying Fort Moultrie. S. C. seceded 1860, Dec. 20, and demanded the surrender of the fort; but six days afterward Maj. Anderson removed his force, under cover of darkness, to the smaller and more defensible Fort S.—the state authorities taking possession of all other Federal property in the harbor and city the next day. The Confederates under Gen. Beauregard at once laid siege to Fort S., extinguished all harbor lights, removed the channel buoys, erected batteries on Sullivan's and Morris islands, occupied and strengthened Forts Pinckney and Moultrie, and when the steamer *Star of the West,* with provisions and reinforcements for the garrison, attempted to reach Fort S

1861, Jan. 9, she was fired upon and compelled to withdraw. These were the first shots in the civil war. Apr. 11, the Confederate Gen. Beauregard demanded the surrender of the post, which Maj. Anderson refused. The next day, on one hour's notice, all the Confederate batteries opened fire on the fort, which was defended by a total of 75 enlisted men. Hot shot set the quarters and barracks within the fort on fire, and on the 13th the garrison was reduced to such extremity that Maj. Anderson agreed to surrender on the 14th, with the honors of war. The Confederates at once proceeded to strengthen the fort and provide it with rifled guns and a strong garrison; and for two years they held undisturbed possession. A naval force of 9 iron-clads under Rear-Admiral Dupont made a gallant but unavailing attack upon the fort 1863, Apr. 7; and in Aug. following Gen. Gillmore destroyed its batteries and demolished the walls on two of its faces from breaching batteries erected on Morris island; but the attempt to capture it failed. When the Confederates abandoned Charleston, 1865, Feb., the Union forces took possession of the fort. On Apr. 14 following, Maj. Anderson's battle-flag of 1861 was raised over the ruins of the fort with impressive ceremonies, including an oration by Henry Ward Beecher, who had been invited by the U. S. govt. for that service.

SUMTER, *sŭm'tĕr*, THOMAS: 1734–1832, June 1; b. Va.: milit. officer in the revolution. He removed to S. C. early in life; took part in the Cherokee war; was appointed lieut.col. 2d S. C. riflemen 1776, Mar.; soon afterward was promoted col.; and served in the n. part of S. C. till after the fall of Charleston, 1780, May. He then determined to wage a partisan warfare against the British; collected a force of refugees in N. C.; surprised and cut to pieces a co. of mounted inf. 1780, July 12; unsuccessfully attacked the British post at Rocky Mount, Aug. 1; defeated and routed the Prince of Wales regt. at Hanging Rock, Aug. 6; captured a valuable convoy Aug. 16; and was routed by Tarleton, Aug. 18. In Nov. he gained a victory at Broad River and defeated Tarleton at Blackstocks, and 1781, Jan., received thanks of congress for his services. He co-operated with Marion, Pickens, and other leaders till the close of the war. Congress and S. C. gave this brave and energetic soldier the well-earned commission of brig.-gen. He was a member of the federal constitutional convention; member of congress 1789–93 and 1797–1802; U. S. senator 1801–09; and U. S. minister to Brazil 1809–11.

SUMY, *sō'mē:* town of Russia, govt. of Kharkov; 90 miles n.w. of the town of Kharkov, on the Psiol. It contains several factories, and has an important annual fair. Pop. (1880) 26,000; (1894) 22,853.

SUN, n. *sŭn* [Goth. *sunno;* Icel. *sunna;* Dut. *zon;* Skr. *sûnu*, the sun]: the great luminary of day which gives light and heat (see below): the sunshine; a sunny place: in a *figurative sense*, anything eminently splendid and luminous: V. to expose to the sun's rays. SUN'NING, imp.: ADJ. lying or basking in the sun. SUNNED, pp. *sŭnd.* SUNNY, a. *sŭn'nĭ*, proceeding from the sun, or exposed to its rays; warm; bright. SUN'NINESS, n. *-nĕs*, state of being sunny. SUNLIKE, a. like the sun. SUN'LESS, a. *-lĕs*, dark; shaded. SUNBEAM, n. ray of the sun. SUNBLIND, covering for a window to subdue the light. SUNBURNED or -BURNT, a. discolored or darkened by the sun's rays; tanned, as the complexion; scorched. SUN-CLAD, a. clad in brightness, as of the sun. SUN DEW, n. *-dū*, plant of the genus *Dros'ĕrā*, ord. *Droserāceæ*, so named from its leaves being covered with drops of fluid in sunshine (see below). SUN-DIAL, instr. to show time by means of a style casting a shadow on a carved plate or surface (see DIAL). SUN-DOG, luminous spot, sometimes seen near the sun. SUNDOWN, time when the sun sets (preferably SUNSET, q.v.). SUNFLOWER, plant of the genus *Helĭan'thus*—so called from its large disk with yellow rays, or from the habit attributed to it of turning round and following the course of the sun (see below). SUN'RISE, or SUN'RISING, first appearance of the sun above the horizon; early morning. SUN'SET, or SUN'SETTING, time when the sun is disappearing below the horizon; evening. SUNSHINE, n. the direct rays of the sun, or the place where they fall; warmth; illumination. SUNSHINE, or SUNSHI'NY, a. *-shī'nĭ*, clear; warm or pleasant; bright like the sun. SUN-STONE, a resplendent variety of felspar, deriving its play of colors from minute imbedded flakes or crystals of iron-glance. SUN'WARD, ad. *-wĕrd*, toward the sun. SUN OF RIGHTEOUSNESS, in *Scrip.*, a title applied to Jesus Christ as the great source of moral light and spiritual life. UNDER



Sun and Planet Wheels.

THE SUN, in this world; on the earth. SUN AND PLANET WHEELS, in *mech.*, contrivance for converting the reciprocating motion of a beam into a rotatory motion.

SUN, THE: great luminary which is the centre of our planetary system, and on which depends all life on our globe. From the earliest ages it has drawn the wonder and admiration of men, and its worship was probably the very first form of idolatry: see SUN-WORSHIP.

When the true system of the universe became known, one of the first labors of astronomers was to ascertain the distance and size of the sun, and these have been known for some time with an approach to accuracy; but until lately, the most vague theories regarding its chemical and physical constitution have prevailed. Within the last few years, however, knowledge of its chemical and physical constitution has increased with a rapidity probably unequalled in any other branch of science.

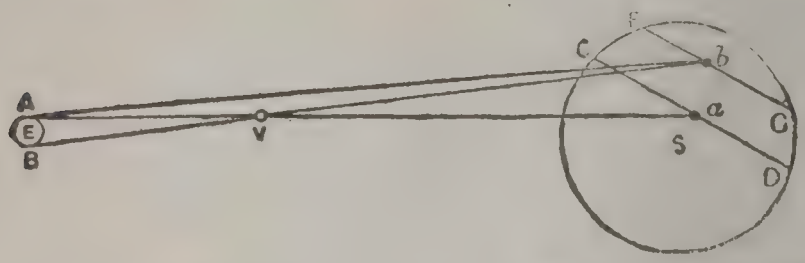
Our knowledge regarding the sun is here arranged under three heads: *the general relations of the sun to our globe; the sun's chemical constitution;* and *the sun's physical constitution.*

Distance of the Sun from the Earth.—The difficulty in ascertaining the Parallax (q.v.) of the sun arises from the smallness of the base line as compared with the distance of the object. The distance of the observing stations must always be less than 8,000 m.; from this the parallax of the moon, which is only 30 times 8,000, can be observed directly with approximate correctness. But when the distance is many thousand times the length of the base line, the triangle is 'ill-conditioned' or unfavorable to accuracy, and the problem must be approached indirectly. The first attempt to measure the distance of the sun was by the Greek astronomer Aristarchus, B.C. 3d c., who made it only about one-twentieth of what we now know it to be. Even the great astronomer Kepler in the 17th c. could say only that the distance must be at least between 13 and 14 millions of miles. From transits of Venus, 91,500,000 m. came to be accepted as the approximate distance of the sun until the transit of 1874, which had for its successor that of 1882: there will not be another until 2004, June 8.

The way in which a transit is turned to account may be understood from the accompanying diagram, where E represents the earth; V, Venus; S, the sun. It is to be premised that the *relative* distances of the planets from the sun are well known. Their periodic times can be observed with accuracy, and from these, by Kepler's (q.v.) Law, we can deduce the *proportions* of the distances, but not the distances themselves. It is thus known that if the distance of the earth from the sun is taken as 100, that of Venus is 72. In the fig., then, AV is 28, about one-third of V*a* or V*b*.

An observer at a station, A, on the northern part of the earth will see the planet projected on the sun as at *a*, while a southern observer will see it at *b*. The distance of the sun from Venus being about three times her distance from the earth, it is obvious that the distance *ab* will be three times the distance AB; and it is a great advantage to have the stations A, B, as far apart as possible, as the interval *ab* is thus increased and its measurement rendered more accurate.

But how is it measured? For each observer sees only one of the spots, and does not know where the other is; and there are no permanent marks on the sun's surface to guide us. The difficulty is overcome in the following way: Each observer notes the exact duration of the transit, that is, the time that the spot takes to travel from C to D, or from F to G. Now as we know the rate of Venus's motion in her orbit, this gives us the lengths of the lines CD and FG in minutes and seconds of arc. Knowing



then the angular diameter of the sun (32′) and the lengths of two chords CD and FG, we can easily, by the properties of the circle, find the distance *ab* between them. This gives us the angle *a*A*b*. In the triangle AV*b*, then, we know the angle at A and the proportion of the sides AV and V*b*, and from that we can find the angle A*b*V or A*b*B. Now this is the quantity sought, being the parallax of the sun as seen from two stations on the earth. Whatever the distance AB actually is, the angle is reduced to correspond to a distance equal to the earth's semi-diameter.

The first partial discussion of the British observations 1874 gave, according to the astronomer royal, a result of $93\frac{4}{10}$ millions of m. A more extended discussion afterward announced results in $92\frac{5}{10}$ millions of m. At the Brit. Assoc., 1883, Mr. Ball stated the sun's distance at 92,700,000 m.—a total which cannot probably be more than 300,000 m. wrong.

Astronomers, however, are turning with greater hope to other methods, especially to observations of Mars, and of some of the minor planets. From observations of Mars, 1862, the Amer. astronomer Newcomb deduced a distance of $92\frac{2}{10}$ millions of m. Mr. Gill's observations on Mars 1877 were made by means of the heliometer, the most effective of instruments for such purposes. From such of his observations as had been reduced Mr. Gill announced his belief that the sun's distance will prove to be nearer 93 than 92 millions of miles.

The other important numerical facts relative to the sun are the following: Its *diameter*, calculated on the basis of the shorter distance hitherto received, is, in round numbers, 866,500 m., or more than $109\frac{1}{2}$ times the mean diameter of the earth; so that the *volume* or bulk of the sun exceeds that of the earth 1,300,000 times, and is 600 times greater than the bulk of all known planets together. The *mass* of the sun, or quantity of matter that it contains as measured by weight, exceeds that of the earth only 330,000 times; thus it appears that the matter of the sun has only one-fourth the density of that of the earth, and

but 1¼ times that of water. From this and other facts, it is inferred that the matter of the sun exists for the most part in gaseous condition. Still his mass is between 700 and 800 times greater than the masses of all known planets together. The *period of rotation* of the sun on its axis, which Galileo was the first to calculate from observations of the sun-spots, and which takes place in the same direction as that of the earth, is about 25 days at the sun's equator, and 27 at latitude 40°, owing to drift of the photosphere. The *inclination* of the axis of the sun to the ecliptic is about 7½°, and the *longitude of the ascending node* is about 74° 30′.

Chemical Constitution of the Sun.—Astronomy weighed and measured the sun long ago, and in our days, chemistry, aided by physics, makes an analysis of it: see SPECTRUM. The main fact on which the method rests is briefly this: that a substance, when comparatively cold, absorbs the very same rays which it gives out when heated. Hence it was inferred by Kirchhoff, that if there were sodium or iron in a comparatively cold state in the solar atmosphere, above the source of light, these substances would produce black lines corresponding in spectral position with the bright lines which they give out when heated. On this principle the following elements are identified in the solar spectrum: iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper (?), hydrogen, palladium, vanadium, molybdenum, strontium, lead, uranium, aluminium, cerium, cadmium, oxygen, and probably indium, lithium, rubidium, iridium, cæsium, bismuth, tin, silver, glucinum, lanthanum, yttrium, and carbon. In 1877, Prof. Henry Draper (q.v.) of N. Y., announced the discovery of oxygen. A chief source of complication in research of this kind is the possible effect on the spectra of substances produced by excessive heat, which seems to dissociate the groups of atoms forming the molecules, or produce allotropic states unknown on the earth, or even resolve some elements into components. Certain unknown spectrum lines are those attributed to hypothetical elements named helium and coronium—the latter very constant in the corona and thought to indicate something more tenuous than hydrogen. But the subject is full of unsolved riddles that cannot be stated here. The labors of Lockyer, Huggins, Janssen, Draper, and others have been directed toward overcoming these and other obstacles.

Physical Constitution of the Sun.—Astronomers are now agreed, for the most part, that the body of the sun is composed of intensely heated gases, though under such enormous pressure that they may be comparable to a viscous mass, while the great heat forbids their taking the distinctive character of liquid or solid. Outside of this body of the sun, the gases, relieved of the exceeding pressure, are condensed into the highly heated luminous vapors that form the photosphere, the vapors being any chemical elements or compounds in minute molten droplets. This brilliant shell of vapor seems made up of clouds immersed in gas,

giving the sun a mottled and more or less reticulated appearance; and the clouds are apparently composed of columns of condensation, in general vertical, with enlarged tops, as discerned in the penumbra of a spot, where they bend like threads inward toward the dark umbra. The 'rice-grains' and 'willow-leaves' were mal-observations. The *faculæ* are irregular uprisings or upbursts of the photospheric clouds, as may be seen near the edge of the sun; and they abound most in the vicinity of spots. Outside of the photosphere, but also penetrating it, is the chromosphere, averaging 5,000—6,000 ft. thick, its nature and red color due to the principal component, incandescent hydrogen; it swells into domes and various forms (called prominences and protuberances), and these are of two classes: the quiescent, cloud-like, hydrogenous, resembling cirrus, stratus, cumulus, etc., usually connected with the chromosphere by stems or columns; and the eruptive or metallic, usually in the form of spikes or jets, sometimes like whirling water-spouts, and of every variety of fantastic form, often changing rapidly, their velocity upward often exceeding a hundred m. a second; the spectrum of these is very complicated, indicating many gaseous metals, and they seem outbursts from the depths of the sun, usually in the vicinity of a spot, rushing through narrow vents in the dense clouds of the photosphere, and perhaps originating in deep explosions. They rise ordinarily 20,000—30,000 miles, but sometimes equal or exceed the highest projections of the first class, one of which is recorded as 13 minutes of an arc, or 350,000 miles. Outside of the other envelopes is the mysterious corona, 'an irregular halo of faint, pearly light, composed for the most part of radial filaments and streamers, which extend outward often more than a million miles,' and change but gradually. It was supposed to be of the nature of the aurora borealis, but the spectrum line is different. There is evidence that it contains glowing gaseous matter in a somewhat regular atmosphere around the sun, 300,000 m. high, and that the streamers and intervening rifts are due to something like mist or dust that reflects light, giving a continuous spectrum; but the subject is still in doubt. The coronal streamers are most developed midway between the sun's equator and poles, those from other latitudes leaning toward these generally, and so giving the corona a tendency to appear as a vast four-rayed star. While meteoric matter probably abounds near the sun, it cannot account for the forms assumed by the corona.—The two rival theories of the sun-spots that have nearly excluded others are Faye's, that the spots are down-rushes of cooler matter, due to eddies in the drift of the photosphere (a supposition discountenanced by too much assumption in regard to the drift, and by the rarity of vorticose motion in a spot); and Secchi's latest theory, that comparatively cooled material from neighboring eruptive projections descends and by its weight depresses the photosphere locally. Prof. C. A. Young modifies this by attributing the depression to diminished upward pressure from below, in consequence of

neighboring faculæ or other eruptions. The umbra or dark portion of a spot may be some hundreds of miles deep, and is dark only by comparison with the surrounding brightness; its penumbra resembles a wall sloping toward the umbra. Single spots have measured 50,000 m. in diameter. The spots occur mostly between latitudes 10° and 30°, both n. and s.; they have never been noticed but once beyond 45°. Their duration is from a few hours to 18 months. Their periodicity of maximum and minimum numbers has been verified from observations and records extending back 150 years, but was discovered by Schwabe 1851. The mean period is $11\frac{1}{9}$ years, with average variability of 2 years, and the extreme variation of $7\frac{3}{10}$ and $16\frac{1}{10}$ years; and there is thought to be a possible superimposed fluctuation of half a century. From minimum to maximum the average is $4\frac{1}{2}$ years; from maximum to minimum, $6\frac{6}{10}$. Computing from the minimum that occurred the last of 1878, the following minimum should have been at the beginning of 1890. The cause of the periodicity cannot thus far be explained by the position of the planets; and, in the absence of any explanation, may be supposed to result from cumulative actions and reactions within the sun itself. The connection with terrestrial facts has been the subject of much discussion. There is certainly a striking coincidence with the periodical increase and decrease of magnetic oscillation; and the spots have had striking and immediate responses in magnetic storms and auroras. The evidence is thought to indicate a slight lowering of temperature on the earth in the maximum period of solar disturbance, perhaps due to the more heat-absorptive condition of the solar atmosphere, filled with products of eruption. The evidence that maximum terrestrial storms and rainfall occur at (or one year after) the spot maximum, is very conflicting. No good correspondence has been made out for cholera, nor for commercial crises, crops, famines, etc.

The intensity of the sun's light would be doubled, perhaps quadrupled, if there were no partial absorption by its own atmosphere. As it is, it is 5,300 times the brightness of molten metal at white heat. A powerful electric arc appears black when seen against the sun. The heat of the sun on the earth's surface is equal to 1 horse-power on every 30 sq. ft. (and attempts have been made to use it by large concave mirrors to drive engines); on the sun's surface, it is equal to 10,000 horse-power to each sq. ft. Calculations in thousands of degrees F. have been very conflicting. The most powerful lens ever constructed brings the sun in effect within 250,000 m. distance, and instantly melts or vaporizes fire-clay, platinum, and diamond. If a column of ice $2\frac{1}{4}$ m. in diameter extended from the earth to the sun, and the entire heat of the sun were concentrated on it, it would dissolve in one second, and be scattered in vapor in 7 seconds. It is this solar energy on which all terrestrial motion and physical life depend. 'What drives that locomotive?' said George Stephenson, and he answered himself—'The sun'—its energy having reorganized carbon in plants of the Carboniferous age, and stored itself up in

coal, to be liberated when the carbon rushes into union with oxygen. The energies of the sun, however, are not three, except as converted into heat, light, and chemical power; at the heat end of the spectrum, the two latter effects are not produced; at the 'actinic' end, the two former are not.—The cause of the sun's heat was for a while referred to a continuous storm of meteorites, the fall converted into heat; but, while this theory may have subordinate place, astronomers incline to the theory that the sun's contraction (too slow to be perceptible on earth) is the prime cause, a process of giving off heat in comparative condensation, familiar in common examples. Under this theory, the sun will not support earthly life more than ten million years longer, and its life-sustaining history extends back not over eighteen million years; so that evolution of life must have been 28 times faster than some of its advocates have calculated.—See Prof. C. A. Young, *The Sun.*

S'UNAHS'EPHA, *sô-nâ'sē-fa:* in the ancient legends of India, son of a poor Brahman who was sold by his father for 100 cows to *Haris'chandra* (q.v.), who offered him as a victim to Varun'a, instead of his own son Rohita, whom he had vowed to sacrifice to this god. The legend relates that when S. was bound to the sacrificial post by his own father, he prayed in succession to various gods, including the Dawn; and while he was praising the Dawn, was freed from his fetters.

SUNART, Loch, *loch sôn'ârt:* inlet of the sea in w. Argyleshire, length 19 miles.

SUN'BIRDS (*Cinnyridæ*): family of birds of order *Insessores*, tribe *Tenuirostres*, which may be regarded as a connecting link between the Creepers and the Humming-birds, and as occupying nearly the same place in the tropical parts of the old world which belongs to the humming-birds in America. They are of small size, though none so small as the smallest humming-birds; they rival humming-birds in brilliancy of plumage, and like them they feed on the juices of flowers, which they suck by their long bill; they do not, however, flutter on the wing when feeding, like humming-birds, but perch on or beside the flower. The species are very numerous, and are natives of s. Asia, the E. Archipelago, and Africa. The resplendent metallic plumage belongs only to the male.

SUNBURY, *sŭn'bĕr-ĭ:* borough, cap. of Northumberland co., Penn.: on the Susquehanna river, and on the Northern Central, the Pennsylvania, and the Philadelphia and Reading railroads; 36 m. s. by e. of Williamsport, 53 m. n. of Harrisburg. It is an important shipping point for coal and for lumber and its manufactures; has several flour-mills, foundry, iron-works, rolling-mill, nail-works, organ factory, and coffin factory; and contains the repair shops of the Philadelphia and Erie div. of the Pennsylvania railroad, a court-house, 7 churches, high school, graded schools, library, public hall, 1 national bank (cap. $200,000), 1 trust and safe-deposit company, and 2 daily and 3 weekly newspapers. Pop. (1890) 5,892; (1900) 9,810.

Sunbird (*Nectarinia phœnicura*).

Round-leaved Sundew (*Drosera rotundifolia*).

SUNDA, *sŭn'da*, ISLANDS: great chain of islands belonging to Malaysia, extending east, beginning with Sumatra (q.v.), and ending with Timor (q.v.), and separating the Java Sea from the Indian Ocean. Sunda Strait is a passage 70 to 90 m. wide, between Sumatra and Java. A dreadful volcanic eruption (1883, Aug. 26) at the small island of Krakatoa, in the strait, did fearful damage on the shores of Sumatra and Java, and raised new volcanic islets in the strait, so that a new survey was rendered necessary.

SUNDAY, n. *sŭn'dā* [AS. *sunnan dæg*, Sunday—from *sunnan*, of the sun; *dæg*, day: Dan. *söndag;* Dut. *zondag*, Sunday—so called from its being the day dedicated to the particular worship of the *sun*]: first day of the week; the Christian Sabbath, properly the Lord's Day: ADJ. pertaining to the Lord's Day.—See SABBATH; LORD'S DAY, THE.

SUNDAY SCHOOLS: schools on the Lord's Day for religious instruction. They are usually said to have been founded about 1780–1 by Robert Raikes, printer, in Gloucester, England. Visiting the suburbs inhabited by the lowest class of people, he was struck with concern at the noise and riot and the cursing and swearing of the dirty children in the streets; and he engaged four women, who kept dame schools, to instruct as many children as he should send them on the Sunday, in reading and the church catechism, for which each teacher was to receive one shilling a day. Improvement soon appeared in the manners and morals of the children, who came in considerable numbers; and many learned to read, and to say their catechism. This humble endeavor by Raikes was doubtless the occasion of the great modern Sunday-school movement which has become one of the chief religious features of the 19th c.: it was the first stir that succeeded in developing into a general popular impulse, and thence into a world-wide system of S. S. But this was very far from being the first Sunday school in Britain or America: John Knox founded S. S. in Scotland about 1560; Joseph Alleine in Bath, England, 1650–68; Bp. Frampton, in England about 1693; and S. S were formed at Glasgow (about 1707) and Brechin (1760), Scotland, also at several places in England and Ireland before 1780. The first Sunday school in the United States was at Roxbury, Mass., 1674 (see below). Indeed, S. S. date from the early Christian centuries. Luther founded them (or their equivalent) 1529. Cardinal Abp. Borromeo in Milan established them (1560–84) throughout his diocese, on a system almost the same as that now in vogue.

Returning to the modern Sunday-school movement in England, we find that in 1784 general attention was drawn to Raikes's plan; numerous schools on the same model sprang up in all the principal English towns; and a society was formed in London 1785 for establishment and support of S. S. throughout the kingdom. Like all new movements, this met strong opposition. Many good people foresaw great danger in its tendencies; the bp. of Rochester openly attacked it; the abp. of Canterbury summoned the

bishops into consultation concerning measures for stopping it; some Scotch presbyteries discountenanced it. This was the first stage of the Sunday school. Its chief practical impediment was the expense of hiring so many teachers. Even in Gloucester, the birthplace of modern S. S., all the S. S. were closed for a time for lack of funds. The idea of gratuitous instruction was probably suggested by necessity to many minds: it was the means of starting S. S. on a new career; and the idea spread so rapidly that in 1800 the teaching had become almost universally gratuitous. A higher class of teachers offered their services; the schools ceased to be filled by the very poorest alone; and handsome buildings were erected in connection with the different churches and chapels, or by general subscription. The secular teaching, which in certain instances included writing and arithmetic, was not of very high order; but it placed the key of knowledge in the hands of multitudes who would otherwise never have been able to read; and the religious instruction which was combined has wrought unmeasured good. In 1803 the London Sunday-school Union was formed, which now issues numerous publications and has travelling agents and branch societies in every part of the kingdom. In later years the Sunday school entered on a third stage; the multiplication of week-day schools having obviated the necessity for teaching reading in S. S., they gradually became restricted to religious instruction; and this is now their work.

In Scotland, S. S. found public recognition 1782, and became general 1797. At first they met opposition in some of the presbyteries; but they long ago received the support of all the churches. The names of Dr. Chalmers, James Gall, author of the *Lesson System*, and David Stowe, author of the *Training System*, deserve mention in connection with the progress of S. S. in Scotland. In Ireland, Raikes's system of S. S. was adopted 1785; and the Sunday School Soc. for Ireland was established 1809.—S. S. thrive in the Prot. churches of France; and through the assiduous efforts and aid of Albert Woodruff, of Brooklyn, N. Y., have in recent years had great extension in that country. They have been planted in parts of Germany and Italy. The missionaries carry them to all heathen lands.

In the United States, a Sunday school was organized in Roxbury, Mass., 1674; in Plymouth, Mass., 1680; in Bethlehem, Conn., by Dr. Joseph Bellamy 1740, and it is claimed much earlier; in Ephrata, Penn., by Ludwig Häcker 1639–40, continuing more than 30 years and blessed with many revivals. In 1790 the Meth. conference at Charleston, S. C., directed the formation of S. S. for white and for black children, with unpaid teachers. In 1791, under influence from the movement in Britain, a First-day or Sunday-school soc. was formed in Philadelphia, and still continues. The New York Female Sunday-school Union, and another, male, were organized 1816. The Philadelphia Sunday and Adult School Union was founded 1817, and enlarged into the American Sunday-school Union (undenominational) 1824. This soc. issued

the first book for its schools, *Little Henry and his Bearer*, 1817; employed its first permanent missionary 1821; issued its first illustrated paper for children 1823; its first monthly for teachers 1824; its first uniform lessons 1826, followed by question books and teachers' assistants; a Bible Dic., Biblical Antiquities, Biblical Geography, Notes on Lessons, 1827–33; and its first weekly journal for teachers 1830. In 62 years this soc. organized 79,000 schools, with 3,320,000 pupils; assisted 131,000 schools; and distributed by sale and gift $8,000,000 worth of religious literature. The Massachusetts Sunday-school Union was formed 1825, succeeded by the Mass. Sabbath-school Soc. 1832, and this by the Congl. Sabbath-school and Publishing Soc. 1868. The Meth. Episc. Sunday-school Union was begun 1827, and reorganized 1844; its work has very great extent. The Presb., Bapt., and Luth. publication boards have Sunday-school departments, and the Evangelical Knowledge Soc. cares for Sunday schools in the Prot. Episc. Church. Other denominations have similar arrangements. The Rom. Cath. S. S. are everywhere active and prosperous.—Conventions to promote this cause were held in the eastern and middle states 1820–26; national conventions in New York 1832, in Philadelphia 1833 and 59, in Newark, N. J., 1869, in Indianapolis 1872 (when uniform lessons were adopted), in Baltimore 1875, Atlanta 1878, Toronto 1881, Louisville 1884. Institutes for teachers were held 1864–75, followed by summer 'assemblies.' The list of lessons agreed upon for 1872 was so well received that a seven years' course was prepared, and this system has since come in general and even international use—in the United States, Great Britain, and many other European countries, Mexico, Australia, Syria, India, China, etc.—among many Prot. denominations. The number of Sunday schools in the United States 1891 was 108,252. International conventions have been held since 1892. At that in 1892, the United States reported 139,520 schools, with 1,414,589 teachers and 11,462,414 pupils; in North Am., including Mexico and Central America, 152,959 schools, 1,511,188 teachers and 12,297,405 pupils; in the whole world, 254,401 schools, with 25,856,582 teach. and pupils.

At the Raikes centenary celebration 1881, there were reported for England and Wales, Sunday-school teachers numbering 422,222, scholars 3,890,000; in 1902 the numbers were 158,104 and 1,500,242. It must be noted that these statistics include only the Prot. S. S., and that they can be only approximate. In the Rom. Cath. church also this agency has had grand development.

SUNDER, v. *sŭn'dĕr* [Icel. *sundr*, in separate parts; *sundra*, to tear to pieces: Ger. *sonder*, separate: Dan. and Sw. *sönder*, apart]: to part; to separate; to divide. SUN'DERING, imp. SUN'DERED, pp. *-dĕrd*. IN SUNDER, in two parts. SUN'DRY, a. *-drĭ*, more than one or two; several. SUN'DRIES, n. plu. *-drĭz*, several things; collections of things or items of various kinds, too many or small to be particularized.

SUNDERBUNDS, n. *sŭn'dĕr-bŭndz:* alluvial tracts in Brit. India, presidency of Bengal, comprising a number of low islands, forming the delta of the Ganges. The tract extends e. from the mouth of the Hoogly to the island Rabanabad; 158 m. long, 75 m. broad; 5,341 sq. m. The pop. is inconsiderable. The islands are separated by narrow channels, through which the waters of the Ganges force their way to the sea. The chief channels (14 in number) are navigable for the largest craft in inland navigation. In such of the islands as have not been cleared, are luxuriant forests—lairs for the tiger, wild boar, and other ferocious animals. Large and fierce alligators abound in the channels. There have been vigorous governmental operations for the clearing of the islands. The climate, though improving, is still very unhealthful. Rice, sugar, and indigo are produced in the cleared districts. Large quantities of fish from the waters of the S. are sent to Calcutta.

SUNDERLAND, *sŭn'dĕr-land:* thriving municipal and parliamentary borough and seaport, county of Durham, England; at the mouth of the Wear, 13 m. n.e. of Durham, 12 m. s.e. of Newcastle, 77 m. n.n.w. of York. The town may be said to be coextensive with the parliamentary borough, and to include the suburbs Bishop-Wearmouth on the s. bank, and Monk-Wearmouth and Southwick on the n. bank of the river, connected with S. proper by an iron bridge of one arch, 236 ft. long, and nearly 100 ft. above the river at low water. The bridge over the Wear was erected 1796, repaired and widened 1858 by Robert Stephenson. On both sides of the river are extensive wet docks, largely reclaimed from the sea. The harbor, defended by batteries, is formed by two great piers, one 1,950 ft., the other 1,500 ft. in length; and the port is resorted to by vessels of the largest tonnage, from all commercial countries. The exports (chiefly coal) have a value of more than £700,000 per annum. After Newcastle, S. is the greatest coal-shipping port in the world. There is a large infirmary and a spacious workmen's hall. Ship-building is one of the principal industries. Glass, earthenware, ropes, and chains, anchors, and other iron-wares, are very extensively manufactured. The public park of about 70 acres is adorned with a bronze statue of Gen. Sir Henry Havelock, native of the town. In 1881 the harbor extension was decided on. There is a considerable fishery. Pop. municipal borough (1871) 98,242; (1881) 116,262; (1891) 130,921; (1901) 146,565.

SUN'DERLAND, Charles Spencer, third Earl of: 1675–1722, Apr. 19; second son of the second earl. He was sec. of state in the reign of Queen Anne, and under George I. rose to be all-powerful; but 1721, being accused of accepting an enormous bribe from the directors of the South Sea Scheme (q.v.), he found it necessary to resign office. He was naturally a plotter and schemer, and was under suspicion of having intrigued for restoration of the tories, if not for the return of the Pretender.—His title descended to Charles Spencer, his second son; who suc-

ceeded 1733 to the honors of his illustrious grandfather, John Churchill, when the earldom of S. became absorbed in the dukedom of Marlborough.—His third son, JOHN SPENCER, was ancestor of the Earls Spencer.

SUN'DERLAND, ROBERT SPENCER, second Earl of: 1642–1702; only son of HENRY, first earl, who had been raised to the peerage 1643, for his exertions in the royal cause. After serving as ambassador to several courts, he became 1679 sec. of state. Bp. Burnet says of him: 'He had a superior genius to all the men of business that I have yet known.' At first, he united with Essex and Halifax in opposing Shaftesbury, who wished to set Monmouth on the throne, and favored the exclusion of the Duke of York. He encouraged the king to persevere in the degrading French alliance, and, with the Duchess of Portsmouth, to whom he attached himself, negotiated a treaty by which, in consideration of an annual pension from the French king, Charles was to agree to assemble no parliament for three years. Before the end of the year, S. had shaken off Essex and Halifax; and a new triumvirate, S., Lord Hyde, and Godolphin, succeeded to the confidence of Charles II. The treaty with France was broken off; and S., now afraid of the whigs, engaged the king in a more popular alliance with Spain. After the dissolution of the last of the exclusion parliaments, he lost his office; but the duchess remained faithful to him in disgrace; and by her influence, and that of Lord Rochester, he was, 1682, says Bp. Burnet, 'upon great submission made to the Duke [of York], again restored to be secretary.' He remained in office until the accession of James II., when his influence in the ministry became greater than ever. He who had so often saved himself in the former reign by the influence of the Duchess of Portsmouth, now secured himself another patroness in the king's second wife, Princess of Modena. Although there is reason to believe that he gave some encouragement to Monmouth in his rebellion, he managed with consummate art to obtain the entire confidence of James, and 1685 became prime-minister. He was intrusted with a knowledge of the king's intention to establish the Rom. Cath. as the national church. In 1687, he privately conformed to the Rom. Cath. Church, and afterward openly professed his conversion. His influence was so great that James would grant no favor until he had asked the question: 'Have they spoken to Sunderland?' Yet we find S. about this time in correspondence with the Prince of Orange, afterward William III. Princess Anne described S. as 'the subtillest workingest villain that is on the face of the earth.' Burnet says that he entered into a particular confidence with the Prince of Orange. With profligate but masterly dexterity, he contrived to deceive both his master and Barillon, and to keep them in ignorance of the events passing in Holland. When the prince arrived in England, S. and his wife went to Amsterdam, whence he wrote to the new monarch, claiming his favor and protection on the ground that he had all along been in his

interest. In 1691, he was allowed to return to England, and to kiss the king's hand. In 1695, William III. spent a week at S.'s house at Althorpe. It was imputed to him that he had changed his religion, in the late reign, in order more effectually to ruin King James; and it was generally believed that he had rendered King William, when Prince of Orange, some signal services, which no one else could have done: this belief gained credit from the favor shown him by William. He was made lord chamberlain, and as such took his seat at the head of the council-table. After directing affairs as the acknowledged head of the govt., he resigned office 1697, and retired to private life at Althorpe, where he died. His influence over James II. was largely the cause of that king's discreditable measures.

SUN'DEW (*Drosera*): beautiful and interesting genus of plants of nat. order *Droseraceæ*, three species of which are natives of Britain, found in bogs and moist heathy ground. The most common is the ROUND-LEAVED S. (*D. rotundifolia*). The leaves all spring from the root, and spread out in a rosette, from whose centre springs the flower-stem or scape, with a raceme of flowers all on one side. The leaves of this and the other species are fringed and beset in all parts with hairs, which bear at their extremity viscid glands, and the irritation of these glands causes them to contract and fold up, so that insects are imprisoned by them. Recent observation has proved that these insects are actually digested by the plant, their nutritive material being absorbed by it. Compare the *Dionæa* (q.v.), and see Darwin's *Insectivorous Plants* (1875). The whole plant is acrid, curdles milk, and has reputation for removing corns, bunions, and warts. An agreeable liqueur, *Rossoli* (*Ros Solis*) is made by infusing the plant in brandy, with sugar, etc.

SUN'FISH (*Orthagoriscus*): genus of fishes, of family *Orthagoriscidæ*, having the body abruptly terminating in a very short tail; the dorsal and anal fins long and pointed, united to the short tail-fin; each jaw furnished with a cutting edge of bone instead of teeth. The species chiefly inhabit the seas of warm climates and their food is sea-weeds. The SHORT S. (*O. mola*) is found in all warm and temperate seas, and, when young, is almost perfectly round, but becomes rather more elongated when full grown. The name S. is regarded variously as derived from the form of the fish, and from its habit of floating at the surface of the water, in fine weather, as if to enjoy the sunshine. It attains large size, sometimes more than six ft. in length; and is captured by sailors. Its flesh is not esteemed, becoming when cooked an oily mass of fibres. The liver yields a large quantity of oil, in repute among sailors as an application for cure of sprains, rheumatism, etc. The OBLONG S. (*O. oblongus*) is of longer form, and attains large size.—The name S. is applied also to many other fish, in America especially to the 'pumpkin-seed' fish of the brooks.

SUN'FLOWER (*Helianthus*): large annual plant, of order *Compositæ*. There are many varieties, ranging from the dwarf sorts which grow only 2 ft. high and have blossoms 2 in. across, to the giant sorts which reach a height of 15 ft. with blossoms 18 in. across. In some varieties the main stem sends out many branches which also produce flowers. The popular idea that the flowers of this plant always turn toward the sun, is incorrect. There are about 50 species, some annuals, others perennials. The plant is a native of N. America, but has been widely disseminated and is now largely grown in s. Europe. It is a common plant in gardens in the United States; in some places is grown as a preventive of malaria; is cultivated sometimes on treeless prairies for its stalks, used as fuel; and is often grown for the seeds, of which 50 bushels per acre are sometimes obtained. The seeds are valuable for feeding to poultry and cattle, and for making an oil nearly equal to that of the olive. The S. is also a honey-yielding plant, the pith is sometimes used as a substitute for the genuine moxa, and the leaves are fed to cattle. On account of the large proportion of potash which it contains, a S. crop rapidly exhausts the soil.

The indigenous species of *Helianthus* in the United States are many; they are coarse and stout herbs with perennial root, and distinguished from plants of similar appearance by marginless flattened achenia, with two deciduous chaffy scales, not barbed nor toothed, and a chaffy receptacle. The most of them abound s. and w., flowering late in the season, when, in company with the Purple-Cone Flower and the Blazing Star (*Liatris*), they give to prairies a popular reputation for floral display. Of species found e. are *H. giganteus*, 3–10 ft. high, with nearly sessile leaves, rough-hairy beneath; *H. divaricatus*, 1–4 ft., with smooth opposite leaves; and *H. decapetalus*, 3–6 ft., with thin coarsely serrate leaves, supposed original of the cultivated *H. multiflorus*, the disk of which is concealed by abundant petals. *H. doronicoides*, 5–9 ft., of Penn. to Ill. and s., leaves rough above and smooth beneath, is probably the original of the Jerusalem Artichoke (q.v.)—its name a curious corruption of the Italian *Girasole*, a sunflower.

SUNG, v. *sŭng:* pp. of SING, which see.

SUNGA'RIA, or SOONGA'RIA: see DZUNGARIA.

SUNK, v. *sŭngk:* pp. of SINK, which see.

SUNKEN, a. *sŭngk'n* [Ger. *sinken;* Sw. *sjunka*, to fall to the bottom (see SINK)]: lying on the bottom of a river or piece of water; low, as land.

SUNN, n. *sŭn* (*Crotalaria juncea*): leguminous plant (see CROTALARIA), native of India, and in general cultivation there from time immemorial, for the fibre of its bark, which also is called Sunn. It has general resemblance to Spanish Broom, but is an annual. It is cultivated for its fibre, and as food for milch-cows. The seed is sown in April or May, and in Aug. it is pulled, or cut close to the ground—when grown for its fibre—laid in long rows till the leaves begin to rot and separate from the stalks, and

steeped in water for a few days till the bark separates freely. The fibre is not so strong as hemp; yet good cables, canvas, and cloth are made of it. It is exported in considerable quantity. *Tuag* is one of its Indian names, and it is sometimes called *Brown Hemp, Bengal Hemp*, etc.

SUNNA, *sŭn'nâ* (Ar., custom, legal usage): originally among Muslims the sayings and the example of Mohammed and his community, provided they are in accordance with the Koran, the meaning of which, however, is itself explained by the S. The term is therefore (incorrectly) used for the collections of moral and legal traditions traced to the Prophet, which supplement the Koran, somewhat like the Mishna (q.v.), which for the Jews supplements the Laws of the Pentateuch. The S. comprises not only religious doctrines and practice, but also civil and criminal laws, and the usages of common life. This tradition is heard of first during the civil wars among the adherents of the new faïth, about half a century after the Flight. The single traditions, as we now possess them, rarely exceed six lines. The diction is carefully wrought, and the form is that of dialogue. For the credibility and canonicity of a tradition, it was originally necessary that it should have been *heard* by one truthful witness; but this law was much relaxed in after-time. At the end of the 3d c. H., i.e., early in the 10th c., a countless number of individual collections (Mosnad), mostly apocryphal, had been produced by different theologians; but the first who sifted them critically, without regard to any special theological system, was Bochary (d. 256 H., or about A.D. 870). His collection contains 7,275 single traditions, 4,000 being duplicates. Moslim, his pupil, supplemented Bochary with another collection, containing 12,000, again including 4,000 repetitions. Besides these, there are four more 'canonical' collections; by Abû Dawûd (d. 275 H.), Tirmidzy (d. 279 H.), Nasây (d. 303 H.), and Mâga (d. 273 H.). The S., critically used, is, next to the Koran, the most authentic source of Islam. A selection from the different collections (both canonical and other), called *Mishcat Al Masabih*, has been transl. into Eng. by Capt. Matthews (Calcutta 1809).

SUNNINESS, SUNNY: see under SUN.

SUNNITES, n. plu. *sŭn'nīts* [Ar. *sunna*, to regulate, to prescribe as law]: orthodox Mohammedans who receive the *Sunna* (q.v.), a collection of laws and precepts of Mohammed handed down by tradition, as of equal importance with the Koran. SUNNIAH, n. *sŭn'nĭ-â*, one of the sect of Sunnites.—The *Sunnites* are traditionists, and are bitterly opposed to the Shiites (q.v.). They are subdivided into four principal sects, which, though at issue on minor points, are acknowledged, by one another, to belong to the Faithful, and to be capable of salvation; and each has a special oratory at Mecca. The first of these sects are the Hanefites, founded by Abu Hanifa (d. H. 150, or about A.D. 768). They are called 'the followers of reason,' while the other three are guided exclusively by tradition. They allow reason to have a principal share in their decisions on legal

and other points: to this sect belong chiefly the Turks and Tartars. The second sect are the Malekites, founded by Malek Ibn Ans (d. Medina about H. 180, or A.D. 798): as a proof of his piety and humility, it is recorded that when asked for his decision on 48 questions, he would decide on only 16, confessing his ignorance about the others: in Barbary and other parts of Africa, the greatest part of his adherents are found. Mohammed Al Shâfeï (b. Palestine, 150 H. or about A.D. 768,), educated in Mecca, was founder of the third sect, the Shâfæites: he was a great enemy of the scholastic divines, and seems to have been of an original cast of mind. He never swore by God, and always took time to consider whether he should at all answer any given question or hold his peace. The most characteristic saying recorded of him is: 'Whosoever pretends to love both the work and the Creator at the same time is a liar.' He is accounted of such importance, that, according to his contemporaries, 'he was as the sun to the world, and as health to the body;' and all the relations of the traditions of Mohammed were said to have been asleep until he came and woke them. He appears to have been the first who reduced Muslim jurisprudence into a method, making it from a number of vague sayings a science. His followers are found chiefly in Arabia and Persia. Ahmed Ibn Hanbal, intimate friend of Shâfeï, founded the fourth sect, the Hanbalites: he was b. 164 H., or about A.D. 781. His knowledge of the traditions (of which, as is reported, he could repeat no less than a million) was as famed as was his piety. He taught that the Koran was not created, but everlastingly subsisted in the essence of God; a doctrine for which he was severely punished by the caliph Al-Motasem. On the day of his death, no less than 20,000 unbelievers (Jews, Christians, and Magians) are said to have embraced the Mohammedan faith. Anciently very numerous, the Hanbalites now are rarely met with out of Arabia.—The S. are the regular orthodox Mohammedans, and greatly outnumber the Shiites, who are estimated at about 20,000,000: for the differences between the two, see SHIITES.

SUN'-STROKE: see THERMIC FEVER.

SUN WORSHIP—FIRE WORSHIP: widely extended form of ancient pagan religion. Investigation tends to show that nature-worship was the basis of all polytheistic religions, and that the chief deities of the several mythologies were originally personifications of the sun or of particular influences of the sun. The original solar nature of Jupiter, Zeus, Odin, Baal, Amen Ra (see EGYPT), Indra, etc., can hardly be mistaken. See those titles; also SCANDINAVIAN MYTHOLOGY: PHŒNICIA: and for full treatment of the subject, Max Müller's essay on *Comparative Mythology* (Oxford Essays, 1856). The actual sun, however, still continued an object of worship; especially as in the abstract and more strictly personal gods, moral and intellectual attributes came to predominate over and obscure the physical (see HELIOS); and with the worship of the sun was more or less closely associated that of fire—his

representative on earth: see PARSEE: GUEBRES: NEED-FIRE: BELTANE.

The most complete system of sun-worship known was that existing in Peru when discovered by the Spaniards (1526). 'The sun, and the moon, and the stars were imaged in the heart of a Peruvian, and dwelt there;' they 'were his personal friends, as well as his deities; with outstretched arms he appealed to them against their own unkindness, or against the injustice of his fellowman.'—Help's *Spanish Conquest of America.* The Incas, Peruvian monarchs, claimed to be children of the sun, and his representatives on earth: their government was a despotic theocracy, of which the Inca was both high-priest and king. In Cuzco, the capital, stood a splendid temple to the sun, all the implements of which were of gold. On the w. end of the interior was a representation of the sun's disk and rays in solid gold, so placed that the rising sun, shining in at the open east end, fell full upon the image, and was reflected with dazzling splendor. In the place or square of the temple, a great annual festival was held at the summer solstice. The multitude, assembling from all parts of the empire, and presided over by the Inca, awaited in breathless solemnity the first rays of their deity to strike the golden image in the temple, when the whole prostrated themselves in adoration. Sacrifices, similar to those of the Jews, were offered on the occasion, and bread and wine were partaken of in a manner strikingly resembling the Christian communion.

Not only the sun received the devotion of the Peruvians: 'The Moon as the spouse of the Sun, the planet Venus as his page, the Pleiades, and the remarkable constellation of the Southern Cross, were minor deities. The rainbow and lightning were worshipped as servants of the sun; and fire, air, earth, and water were not without adoration.'

SUONADA, *sō-on-ä'da,* called also *Seto-Uchi,* 'inland sea'): inland sea of Japan, separating the islands Kiushiu and Shikoku from the main island, Honshiu or Hondo; about 250 m. long from the strait of Simonoseki to Osaca; greatest breadth about 50 m. It is studded with innumerable islets. The scenery is singularly beautiful and picturesque, but the navigation is difficult. The prince of Nagato and Soulio having, contrary to treaty stipulations, closed this sea to foreign vessels and fired on them, the English, French, and Dutch fleet 1866 destroyed the forts that barred its entrance.

SUP-, *sŭp:* a form of the Latin prefix SUB, which see.

SUP, v. *sŭp* [Icel. *supa,* to sup up liquids: Dut. *zuipen;* Sw. *supa;* Low Ger. *supen,* to drink copiously—connected with *sip* and *soup*]: to take by little at a time, or by mouthfuls, as a liquid; to sip; to eat the evening meal; to treat with supper: N. a small draught or mouthful of a liquid; a sip. SUP'PING, imp.: N. the act of taking supper. SUPPED, pp. *sŭpt,* having taken the evening meal. SUP'PER, n. *-pĕr* [F. *souper*]: the meal at which *soup* formed the principal dish; the evening meal: V. to give its evening

meal to, as to a horse in prov. language; to take supper. SUP'PERING, imp. SUPPERED, pp. *sŭp'erd.* SUP'PERLESS, a. *-lĕs*, being without supper. THE LORD'S SUPPER, the Eucharist; the sacrament among Christians wherein eating bread and drinking wine 'show forth Christ's death.'

SUPER, *sū'pĕr* [L.]: a prefix signifying 'above;' over; in excess: *super* has sometimes the French form *sur:* N. in *theatrical language*, a contr. of SUPERNU'MERARY.

SUPERABLE, a. *sū'per-ă-bl* [L. *superab'ĭlĭs*, that may be overcome—from *supĕro*, I overcome—from *super*, above: It. *superabile*]: that may be overcome or conquered. SU'PERABLY, ad. *-blĭ.* SU'PERABLENESS, n. *-bl-nĕs*, the quality of being surmountable.

SUPERABOUND, v. *sū'pĕr-ă-bound'* [L. *super*, in excess, and *abound*]: to be very abundant; to be more than enough. SU'PERABOUND'ING, imp. SU'PERABOUND'ED, pp. SU'PERABUN'DANT, a. *-bŭn'dănt*, being more than enough. SU'PERABUN'DANTLY, ad. *-lĭ.* SU'PERABUN'DANCE, n. *-bŭn'dăns*, exceeding plenty; more than enough.

SUPERADD, v. *sū'pĕr-ăd'* [L. *super*, above, and *add*]: to add over and above. SU'PERAD'DING, imp. SU'PERAD'DED, pp. SU'PERADDI'TION, n. *-ăd-dĭsh'ŭn*, the act of superadding; that which is added over and above.

SUPERANGELIC, a. *sū'pĕr-ăn-jĕl'ĭk* [L. *super*, above, and *angelic*]: having a nature or being superior to that of angels; connected with the world beyond that of angels.

SUPERANNUATE, v. *sū'pĕr-ăn'nū-āt* [L. *super*, above; *annus*, a year]: to impair or disqualify by age or infirmity; to allow to retire from service on a pension on account of age or infirmity; to pension; in *OE.*, to outlast the year. SU'PERAN'NUATING, imp. SU'PERAN'NUATED, pp.: ADJ. disqualified by old age; allowed to retire on a pension on account of age or infirmity. SU'PERAN'NUA'TION, n. *-ā'shŭn*, state of being too old for office or business; the pension granted for long service, etc. In the Brit. civil service, officials after the age of 60 receive a retiring allowance—the retirance being voluntary: the allowance is graduated in amounts increasing according to the number of years in service.—In the United States there are no civil pensions except those granted by act of congress (1869) to judges of U. S. courts, who, after serving 10 years and reaching the age of 70 years, shall resign their offices; they receive full salary for life. Special grants, however, have been made by congress to individuals for extraordinary reasons, among the latest being pensions to the widows of ex-presidents.—See PENSIONS AND PENSIONERS.

SUPERB, a. *sū-pĕrb'* [F. *superbe*, proud—from L. *super'bus*, haughty—from *super*, above]: distinguished by grandeur, pomp, or richness; stately; showy; elegant. SUPERB'LY, ad. *-lĭ*, richly; elegantly; pompously. SUPERBNESS, n. *sū-pĕrb'nĕs*, the state of being superb.—SYN. of 'superb': grand; great; sublime; noble; majestic; imposing; splendid; magnificent; august; rich; pompous.

SUPERBIPARTIENT, n. *sū'pĕr-bī-pär'shĭ-ĕnt* [L. *super*, over, above; *bis*, twice; *partiens*, pp. of *partior*, to divide]: a number which divides another number nearly, but not exactly, into two parts.

SUPERCARBONATE, n. *sū'pĕr-kär'bō-nāt* [L. *super*, above, in excess, and *carbonate*]: a carbonate which holds the greatest possible quantity of carbonic acid.

SUPERCARGO, n. *sū'pĕr-kär'gō* [L. *super*, above, and *cargo*]: important officer in a merchant-ship, who manages the sales and superintends all the commercial concerns of the voyage.

SUPERCELESTIAL, a. *sū'pĕr-sĕ-lĕst'yăl* [L. *super*, above, and *celestial*]: situated above the firmament.

SUPERCHARGE, v. *sū'pĕr-chärj* [*super*, and *charge*]: in *her.*, to place one bearing on another: N. a bearing or figure placed upon another.

SUPERCILIA, n. plu. *sū'pĕr-sĭl'ĭ-ă* [L. *super*, above; *cĭlĭum*, an eyelid; *cĭlĭa*, eyelids]: the eyebrows, consisting of two arched eminences of integument, which surmount the upper circumference of the orbit on each side, and support numerous short, thick hairs. SU'PERCIL'IARY, a. *-sĭl'-ĭ-ĕr-ĭ*, situated above the eyebrow.

SUPERCILIOUS, a. *sū'pĕr-sĭl'ĭ-ŭs* [L. *supercilĭōsus*, haughty—from *supercĭl'ĭum*, an eyebrow, arrogance—from *super*, above; *cĭlĭum*, an eyelid]: expressing lofty pride by raising the eyebrows; haughty; dictatorial; arrogant; overbearing. SU'PERCIL'IOUSLY, ad. *-lĭ*. SU'PERCIL'IOUSNESS, n. *-nĕs*, haughtiness; an overbearing manner.

SUPERCOLUMNAR, a. *sū'pĕr-kō-lŭm'nĕr* [L. *super*, above, and *columnar*]: in *arch.*, put one above another, as an order. SU'PERCOLUMNIA'TION, n. the putting of one order above another.

SUPERDOMINANT, n. *sū'pĕr-dŏm'ĭ-nănt* [L. *super*, above, and *dominant*]: in *music*, the note above the dominant; the sixth note of the diatonic scale.

SUPEREMINENT, a. *sū'pĕr-ĕm'ĭ-nĕnt* [L. *super*, above, and *eminent*]: eminent in a very high degree; surpassing others in excellence. SU'PEREM'INENTLY, ad. *-lĭ*. SU'PEREM'INENCE, n. *-nĕns*, excellence in a high degree; eminence superior to what is common; also SU'PEREM'INENCY, n. *-nĕn-sĭ*.

SUPEREROGATION, n. *sū'pĕr-ĕr'ō-gā'shŭn* [L. *super*, in excess; *erŏgo*, I ask for a grant of public money, I expend—from *ex*, out of; *rogo*, I ask]: performance of more than duty requires. SU'PEREROG'ATORY, a. *-ĕr-ŏg'ă-tĕr-ĭ*, performed to an extent not enjoined or required by duty. WORKS OF SUPEREROGATION, class of works which, in the Rom. Cath. system, are described as not absolutely required of each individual as conditions of his eternal salvation. Rom. Catholics found this definition on the distinction between what they believe to be commanded and what they hold to be only counselled, for an example of which they appeal to the words of the Lord Jesus to the young man, Matt. xix. 21, in which Christ distinguishes one class

of works necessary in order to 'enter into life,' and a further class which must be done if we 'would be perfect.' Rom. Catholics do not profess to recognize in works of S. any distinctive essential quality by which they differ in physical or moral entity from other works, and in virtue of which, by their own nature, the individual may found on them a personal claim to reward. For works of S., as for all supernaturally good works, they hold that the assistance of God's grace is indispensable; and they do not ascribe to them any merit, except that which arises from God's own free and gratuitous promise and act. The one distinctive characteristic of a work of S. is in its not being prescribed or commanded as absolutely necessary for the salvation of the individual, and its being done for the sake of greater perfection; and the doctrine which teaches the possibility of such works is, according to Rom. Catholics, a necessary consequence of the unequal fervor and unequal degrees of holiness which exist even in the class of the virtuous servants of God. A consequence of the doctrine of S. is that God may accept the superabundant works of one in atonement for the defective service of another; hence in the theory of Indulgences (q.v.), with what they regard as the infinite and inexhaustible treasure of the merits of Christ, they regard also, though in a degree infinitely inferior, the superabundant merits of the saints as forming part of that 'treasure of the church' applied in the form of indulgences.

SUPERESSENTIAL, a. *sū'pĕr-ĕs-sĕn'shăl* [L. *super*, above, and *essential*]: essential above others.

SUPEREXALT, v. *sū'pĕr-ĕgz-awlt'* [*super*, and *exalt*]: to exalt to a superior degree.

SUPEREXCELLENT, a. *sū'pĕr-ĕk'sĕl-lĕnt* [L. *super*, above, and *excellent*]: superior in an uncommon degree. SU'PEREX'CELLENCE, n. *-lĕns*, very great excellence.

SUPEREXCRESCENCE, n. *sū'pĕr-ĕks-krĕs'ĕns* [L. *super*, above, and *excrescence*]: a superfluous growth.

SUPERFECUNDITY, n. *sū'pĕr-fĕ-kŭn'dĭ-tĭ* [L. *super*, above, and *fecundity*]: superabundant multiplication of the species.

SUPERFETATE, v. *sū'pĕr-fē'tāt* [L. *superfētātus*, conceived above another conception—from *super*, over; *fētus*, a bearing, a bringing forth]: to conceive anew while still with young.

SUPERFETA'TION: occurrence of a conception subsequent to the first, in the same female, and while the fetus of the previous conception is still in the uterus. Two fetuses of different ages—offspring possibly of different parents—may co-exist. The cases described as S. may be arranged in three classes; but only to the third class is the term truly applicable. The *first class* includes numerous undisputed cases in which two children bearing evidence in their different colors that they are offspring of different parents are born at the same time. In the slave states the birth from a black woman of a black and a mulatto child at

the same time was not very rare—the former being the offspring of her black husband, and the latter of a white man; the converse also has occurred—a white woman bearing at the same time a white and a mulatto child. There is no difficulty in accounting for these cases, which are instances of contemporaneous conception rather than true S. The *second class* includes those cases in which a twin has been aborted, leaving its fellow undisturbed in the uterus, to be matured and born in due time; or in which twins have been produced at the same time—one fully formed, the other small and apparently premature, from being 'blighted' or arrested in its development at an early period. In these cases there is no reason for believing that the infants were conceived at different periods. The *third class* includes the cases in which a *mature* child has been born, and an *immature* fetus, product of a different conception, has either been left in the womb until its period of maturation, or, if expelled with the other, has presented no mark of wasting or of arrested development. Many cases of S. have been specially discussed by writers on midwifery and medical jurisprudence: the following is a specimen. Dr. Maton, eminent London physician, communicated to the College of Physicians the case of Mrs. T——, Italian lady, who was delivered of an apparently healthy and mature male child 1807, Nov. 12, which lived only nine days: 1808, Feb. 2, or 82 days after the birth of the first, she was delivered of a second child, which likewise had every sign of being completely formed and mature. The following case, which, as Dr. Bonnar (in his *Critical Inquiry regarding Superfœtation*, Edin. 1865) observes, has been the principal battlefield of the advocates and the opponents of S., is recorded by Dr. Desgrange of Lyon. Madame Villard had a miscarriage at seven months 1779, May 20: in about a month thereafter, she conceived again, and 1780, Jan. 20, she brought forth a living child. No milk appeared in her breasts, the abdomen did not seem to diminish in size, and other symptoms which normally follow delivery were absent. The two surgeons in attendance, being naturally puzzled, called in Dr. Desgrange, who declared, in opposition to their views, that there was still a child in the womb; and his opinion was confirmed by her being delivered of a living child 1780, July 6, or 167 days after the first birth. Except for a very few exceptional cases in a number occurring in married life which were collected by Dr. Bonnar, the latter writer adopts Dr. William Hunter's view that 210 days, or seven calendar months, is the minimum period of uterine life at which a child should be born in order to be reared; and he assumes that no prolific intercourse can take place until at least 14 days after the first delivery; and with these axioms he quotes three cases on record in the English Peerage, in which children were born who lived to mature age (e.g., 28 years, 60 years), whose uterine life seemed to have been limited by a preceding birth to the periods respectively of 168 days, 159 days, 113 days: the three cases occurred in families of distinction. These cases, Dr. Bonnar de-

clares, cannot possibly be explained except by the doctrine of S.; and Dr. Taylor (*Principles and Practice of Medical Jurisprudence*, 849) fully adopts his view. Dr. Duncan believes, from anatomical investigations, that till the third month of gestation a second conception may follow the first; and he is of opinion that this will satisfactorily account for all the cases of S. on record.

SUPERFICIAL, a. *sū'pĕr-fĭsh'ăl* [F. *superficiel*, superficial—from L. *superficĭalis*—from *superficĭēs*, the surface of a thing—from *super*, above; *facĭēs*, the face: It. *superficiale*]: being on the surface or exterior part; not penetrating beneath the surface; pertaining to surfaces; showy; without substance; slight; not deep or profound; shallow; more showy than real, as acquirements in any branch of knowledge. SU'PERFI'CIALLY, ad. *-lĭ*. SU'PERFI'CIALNESS, n. *-nĕs*, or SU'PERFICIAL'ITY, *-ĭ-ăl'ĭ-tĭ*, position on the surface; shallow, slight knowledge. SUPERFICIES, n. *sū-pĕr-fish'ĭ-ēz*, the surface; outside; in *geom.*, that which has length and breadth only.

SUPERFINE, a. *sū'pĕr-fīn'* [L. *super*, above, and *fine*]: very fine; surpassing in fineness, used especially of cloth. SU'PERFINE'NESS, n. *-nĕs*, the state or quality of being superfine.

SUPERFLUOUS, a. *sū-pĕr'flū-ŭs* [L. *super'flŭus*, running over, unnecessary—from *super*, above; *fluo*, I flow: F. *superflu*]: more than enough or sufficient; beyond what is wanted; redundant. SUPER'FLUOUSLY, ad. *-lĭ*. SUPERFLUITY, n. *sū'pĕr-flō'ĭ-tĭ* [F. *superfluité*—L.]: greater quantity than is wanted; superabundance; excess; redundancy. —SYN. of 'superfluous': unnecessary; needless; useless; exuberant; excessive.

SUPERFLUX, n. *sū'pĕr-flŭks* [L. *super*, above; *fluxus*, a flowing—from *fluo*, I flow]: in *OE.*, more than what is necessary; that which is in excess of what is required.

SUPERFOLIATION, n. *sū'pĕr-fō-lĭ-ā'shŭn* [L. *super*, above, and *foliation*]: foliation or leafage in excess.

SUPERHEAT, v. *sū'pĕr-hēt'* [L. *super*, above, and *heat*]: in a *steam-engine*, to heat to excess; to heat steam above the boiling-point.

SUPERHUMAN, a. *sū'pĕr-hū'măn* [L. *super*, above, and *human*]: above or beyond what is human; divine.

SUPERIMPOSE, v. *sū'pĕr-ĭm-pōz'* [L. *super*, above, and *impose*]: to lay on something else. SU'PERIMPOSI'TION, n. *-pō-zĭsh'ŭn*, the act or state of being superimposed, or laid on something else.

SUPERINCUMBENT, a. *sū'pĕr-ĭn-kŭm'bĕnt* [L. *super*, above, and *incumbent*]: resting on something else.

SUPERINDUCE, v. *sū'pĕr-ĭn-dūs'* [L. *super*, above, and *induce*]: to bring in or upon, as an addition to something else. SU'PERINDU'CING, imp. SU'PERINDUCED' pp. *-dūst'*. SU'PERINDUC'TION, n. *-dŭk'shŭn*, the act of superinducing.

SUPERINTEND, v. *sū'pĕr-ĭn-tĕnd'* [L. *super*, above, and *intend*]: to have or exercise the charge and oversight of; to have the care of with the power of direction; to oversee or overlook. SU'PERINTEND'ING, imp.: ADJ. overseeing; governing. SU'PERINTEND'ED, pp. SU'PERINTEND'ENT, n. *-tĕnd'ĕnt*, or SU'PERINTEND'ANT, n. *-ănt*, one who has the oversight and charge of something with the power of direction; an inspector; an overseer: ADJ. that overlooks others with authority. SU'PERINTEND'ENCE, n. *-ĕns*, the act of superintending; oversight; care; direction; management; also SU'PERINTEND'ENCY, n. *-ĕn-sĭ*.—SYN. of 'superintendent, n.': manager; supervisor; director; curator; keeper; foreman.

SUPERIOR, a. *sū-pē'rĭ-ĕr* [F. *supérieur*, superior—from L. *superior*, higher; *supĕrus*, high—from *super*, above: It. *superiore*]: higher; more elevated or exalted in place, rank, dignity, office, or excellence; preferable; unaffected or unconquered, as 'a man *superior* to his sufferings': in *bot.*, placed above another organ—applied especially to indicate the position of the ovary with respect to the calyx: N. one of higher rank; one more excellent or more advanced than another; the chief or head of a monastery or convent; in *Scot.*, one who, or whose predecessor, has made the original grant of heritable property to a person called his *vassal*, which property is held by the vassal on such conditions as the payment of an annual fixed sum, or the performance of certain services (see FEU). SUPE'RIORS, n. plu. *-ĕrz*, in *printing*, small letters or figures cast at the tops of the shanks of types, thus (^{6}), used for references to marginal or foot notes, and in works on mathematics. SUPE'RIOR'ITY, n. *-ŏr'ĭ-tĭ* [F. *supériorité*—L.]: quality of being more advanced, higher, or more excellent in certain respects than another; pre-eminency; ascendancy. SUPERIOR PLANETS, the planets at a greater distance from the sun than the earth, as Mars, Jupiter, Saturn, Uranus, and Neptune. SUPERIOR SLOPE, the upper surface of a parapet.—SYN. of 'superiority': excellence; predominancy; prevalence; ascendancy; advantage; odds.

SUPERIOR: city, cap. of Douglas co., Wis.; on Lake Superior, Superior, Allouez, and St. Louis bays, and the Chicago St. Paul and Omaha, the Duluth S. Shore and Atlantic, the Great Northern, the Northern Pacific, the St. Paul and Duluth, and the Duluth and Winnipeg railroads; 8 m. s.e. of Duluth, Minn.; comprises the former towns of S., East S., West S., and South S.. The three bays form excellent connected and land-locked harbors, on which the federal govt., the city, and corporations have expended over $7,675,000 for improvements and shipping facilities. There are over 40 m. of water front and 10 m. of substantial wharfage, and the latter can be increased to over 150 m. by further improvements. The entire water front is divided into harbor districts, and the cost of improvements therein is assessed only on the district directly benefited. Superior bay is protected from storms by two narrow strips of land, Minnesota point and Wisconsin point; St. Louis bay is separated from Superior bay by

Rice's and Connor's point; and between St. Louis and Allouez bays is Grassy point. The city is laid out at right angles with the water front, with avenues 100 ft. wide and streets 80 ft. Along the front are 8 large coal docks, 15 grain elevators, an extensive dry-dock, a dock used exclusively for handling iron ore, and several large ship yards. The city has thorough sewerage, water supply from Lake Superior, electric lights and street railway, 3 belt line and terminal systems, 53 churches, 12 public and 4 parochial schools, public-school property valued at $500,000, a free library (15,000 vols.) 2 weekly periodicals. The state census of 1895 gave the following details of manufacturing interests: Value of real estate and machinery $6,883,828; stock and fixtures $2,249,322; persons employed 2,535; and wages paid $1,234,237. The products were: Flour $9,209,140; articles of wood $1,134,020; articles of iron $458,800; lumber, shingles, and lath $379,205; wagons and carriages $242,135; wines, $108,000. In 1894 the coal receipts were 1,456,400 tons, and wheat 25,486,000 bu.; and the total value of commerce was $42,000,000. Over 2,000 vessels of nearly 3,000,000 tonnage, employed in lake traffic, arrived at and cleared the port. In 1900 the cap. employed was $5,882,562; wage-earners, 1,958; val. products, $7,527,703. During the six months ending June 30, 1903, the receipts of coal were 1,191,309 tons; shipments of flour, 119,900 tons; wheat, 2,026,500 bu.; iron ore, 1,355,133 tons; copper, 4,864 tons; lumber, 17,089 ft.; vessels entered, 926; tonnage, 1,485,430; cleared, 788; tonnage, 1,383,122. In 1900 there were rep. 2 state banks (cap. $250,000); 2 build. loan asso., and 2 nat. banks (cap. $300,000). The total assessed valuation 1902 was $13,209,620, and the total tax rate was $37 per $1,000. The city had a total debt 1903, March 1, of $1,524,035; net debt, $1,265,463. The site of S. was a station of the Hudson Bay company and an Indian trading-post. A town was laid out 1853, but little progress was made till 1885 when additional territory was acquired and a new city plotted with special considerations for its growth as a great commercial and shipping point, a large tract of land on the water front being reserved for railway and storage purposes. A city charter was granted 1889, and 1895 the entire area was divided into 9 wards, while the areas of the former towns continued to bear their old names as local distinctions. Pop. (1890) 11,983; (1900) 31,091.

SUPERIOR, *sū-pē'ri-ēr*, LAKE: largest body of fresh water in the world; near the centre of N. America, highest and most western of the great lakes between w. Canada and the United States. Its general form is nearly semi-lunar, the outer curve toward the n.; greatest length e. to w., 355 m.; greatest breadth, 160 m.; about 32,000 sq. m. The surface is about 600 ft. above sea-level, mean depth 1,000 ft., so that its bottom is 400 ft. below sea-level. Its surface has an elevation of about 22 ft. above that of Lake Huron and Lake Michigan: the greater portion of this rise is at the Sault Ste. Marie, a strong rapid about a mile in length, at the opening of its outlet through the river St. Mary or St. Mary's Strait (q.v.), which transmits the waters of Lake S. to Lake Huron. The Sault Ste. Marie, the only obstacle to navigation between Lake Huron and Lake S., is overcome by a canal on the American side, about a mile in length, with two locks. This is one of the finest canals in the world. The sides and bottom are lined with stone throughout its whole length, the locks are admirably contrived, and the largest ships can pass through it with ease. The trade is increasing rapidly: see SHIPPING. Another canal of large size is in construction on the British side. The boundary between the United States and Canada, starting from the outlet of the lake at the Sault Ste. Marie, sweeps toward the n., so as to include in the United States even the Isle Royale only 13 m. from the British coast, and strikes inland from the mouth of Pigeon or Arrow river, on the n.w. shore.

Lake S., being very near the watershed between Hudson's Bay and the Mississippi, receives no important rivers, though hundreds of streams pour themselves into it. The largest are the St. Louis river (about 110 m. long) which enters its w. extremity at Fond du Lac; and the Neepigon river, on the n. side, which with Lake Neepigon has a length of about 200 m. A small lake near the head of the Albany river, whose waters flow to Hudson's Bay, is only four m. from a bay opposite the State Islands on the n. shore, forming a route with little portage, which has long been used by the Hudson's Bay Company, for conveyance of goods from Lake S. to the country northward. The promontory, Kee-wee-naw, near the middle of the s. side, projects far into the lake. The islands are not numerous, the largest being Isle Royale, 44 m. long.

The water of Lake S. is remarkable for coldness, purity, and transparency, though the affluents on both sides are either turbulent, or deeply colored by vegetable matter from swamps and forests. A rise or fall in the level of the water, amounting to several inches in a few hours, is frequently observed along the shore, and has been supposed due to a regular tide, but is caused probably by the wind. Fresh water being more easily moved by the wind than salt water, great waves arise in Lake S. with wonderful rapidity; and even in summer, large steamers are often compelled to take shelter in some bay, or under the lee of an island. The low temperature of the water, compared with that of the air, in summer, makes fogs prevalent,

resting on the water at night, and vanishing an hour or two after sunrise. Lake S. never freezes over, but the bays are sealed up in winter, and a rim of ice extends to some distance all around the shore.

The country around Lake S. is generally bold and hilly, except the peninsula between it and Lake Michigan; but few of the hills rise more than 1,000 ft. above the lake, and most of them far less. On the s. shore, 100 m. w. of the Sault Ste. Marie, are the Pictured Rocks, cliffs of gray and red sandstone 100 to 200 ft. high, in many places presenting fantastic forms, and marked by numerous perpendicular stripes of red and yellow, from ferruginous waters trickling down the face of the rock.—The rocks around the lake are very ancient, belonging principally to the Laurentian and Huronian systems of the Azoic series, overlaid in some places, especially on the s. side, with patches of the Lower Silurian. The prevalent Laurentian rock is orthoclase gneiss. Among the Huronian rocks are greenstones, slates, conglomerates, quartzites, and limestones. The Lower Silurian rocks are soft sandstones. There is everywhere much evidence of glacial action. The Huronian rocks are stored with useful minerals. The copper and iron mines of the s. side are famed for extent and richness; and there is reason to estimate the mineral resources of the British side equal to those of the American, though as yet comparatively undeveloped. The richest copper-mines are near Kee-wee-naw point. The metal occurs principally native, and sometimes in single masses of great size. One was found 1853, about 40 ft. in length, computed at about 400 tons. Native silver is found associated with the native copper, sometimes intimately mixed with it. A rich vein in an islet in Thunder Bay (British side) yielded in one year silver to the value of $1,230,000. Gold has been found in small specks at Nan ainse on the British side. Lead ore occurs in some places. The beds of hæmatite, or red iron ore, at Marquette, on the s. side, are of wonderful extent: the ore is conveyed by railway to the harbor, thence by vessels to Cleveland, on Lake Erie, and thence by rail to Pittsburgh, where it is smelted.

The fisheries are important. The delicious whitefish and the gray trout abound, as well as other kinds of fish.

The n. shores of Lake S. are frequented by bands of the Ojibbeway tribe of aborigines: they are of very pure blood, retain in great measure their primitive habits, and many of them are still pagans. The white population of the Brit. shore consists chiefly of the fishermen and explorers who visit the region in summer; and of miners who extract the silver ore from veins, the richest yet discovered, on Silver Island, near Thunder Bay. On the American shore, large and prosperous towns have sprung up: Duluth, Minn., at the s.w. corner of the lake, Marquette and Houghton, in Mich., and Superior, Wis., all have grown with great rapidity. The Canadian Pacific railway, along the n. shore, connects that district with the rest of the Dominion. In 1886 the Canadian govt. subsidized the Thunder Bay Colonization railway.

SUPERLATIVE, a. *sū pĕr'lă-tĭv* [F. *superlatif*—from mid. L *superlativus*, in *gram.*, superlative—from L. *superlātus*, excessive—from *super*, above; *lātus*, carried, used as pp. of *ferrĕ*, to carry: It. *superlativo*]: surpassing all others; most eminent; supreme; in *gram.*, expressing the highest degree in the quality of adjectives or adverbs: N. that which is supreme; in *gram.*, a word in the superlative degree. SUPER'LATIVELY, ad. *-lĭ*. SUPER'LATIVENESS, n. *-nĕs*, the state of being in the highest degree.

SUPERLUNAR, a. *sū'pĕr-lō'nĕr* [L. *super*, above, and *lunar*]: being above the moon; not earthly.

SUPERMOLECULE, n. *sū-pĕr-mŏl'ĕ-kūl:* compounded molecule.

SUPERMUNDANE, a. *sū'pĕr-mŭn'dān* [L. *super*, above, and *mundane*]: above the world.

SUPERNACULUM, n. *sū'pĕr-năk'ū-lŭm*, or SUPERNAG'ULUM, n. *-năg'ū-lŭm* [a supposed corruption of L. *super un'gŭlam*, on the nail—from *super*, on or above; *un'gŭla* or *unguis*, a nail]: in *old drinking habits*, emptying the cup to the very dregs, so that there is not enough left to wet the nail of the hand; good liquor, such as would induce one to drink to the dregs: AD. to the last drop; entirely. SUPERNAC'ULAR, a. *-ū-lĕr*, very good, as liquor.

SUPERNAL, a. *sū-pĕr'năl* [L. *supernus*, on high, celestial—from *super*, above]: relating to things above; being in or belonging to a higher place or region; celestial. SUPER'NALLY, ad. *-lĭ*.

SUPERNATANT, a. *sū'pĕr-nā'tănt* [L. *super*, above; *natans* or *natan'tem*, swimming, *natārĕ*, to swim]: floating or swimming on the surface, as oil or leaves. SU'PERNATA'TION, n. *-nā-tā'shŭn*, the act of swimming on the surface.

SUPERNATURAL, a. *sū'pĕr-năt'ū-răl* [L. *super*, above, and *natural*]: in *physical nature*, applied to the action of some power superior to nature and to man, as when effects are produced without causes which are usually required to produce them; exceeding the powers or laws of nature; miraculous. SU'PERNAT'URALLY, ad. *-lĭ*. SU'PERNAT'URALNESS, n. *-nĕs*, the state or quality of being supernatural. SU'PERNAT'URALISM, n. *-ĭzm*, the doctrine of a divine and supernatural agency in the performance of miracles; in *theol.*, the doctrine that the knowledge of God can only be obtained by revelation; the opposite of *rationalism*. SU'PERNAT'URALIST, n. *-ĭst*, one who holds the doctrine of supernaturalism.

SUPERNUMERARY, a. *sū'pĕr-nū'mĕr-ĕr-ĭ* [L. *super*, above; *numĕrus*, a number: F. *surnuméraire*]: exceeding a necessary or usual number; in excess of the number stated: N. a person beyond what is usually needed, or above the stated number: in a *theatre*, an inferior actor.

SUPERPHOSPHATE, n. *sū'pĕr-fŏs'fāt* [*super*, and *phosphate*]: a salt containing more acid and less base than the common phosphate (see PHOSPHORUS).

SUPERPHOSPHATE OF LIME: acid phosphate or hydric dicalcic orthophosphate; a fertilizer containing a large proportion of soluble phosphoric acid (see PHOSPHORUS: PHOSPHATES). It is made from bones (in the form of bone meal, bone black, or bone ash), phosphate guano, or Phosphate Rock (q.v.) treated with sulphuric acid. The use of bones from which the organic matter has not been wholly removed, by burning or steaming, increases the difficulty of manufacture, but the nitrogen which it contains adds somewhat to the value of the product. For purposes requiring considerable organic matter, some makers add nitrogenous substances and sell the material as 'ammoniated,' or 'nitrogenized' superphosphate; but many farmers prefer to buy the plain S. and apply nitrogenous fertilizers separately to the land. The growing scarcity of bones and relative cheapness of phosphate rock has led to the extensive use of the rock; though as it varies greatly in quality it has sometimes been found necessary to use part bone-black in order to bring the material to the required standard. The making of a really good S. requires considerable labor, care, and skill. Proportions vary somewhat, but for 1,000 lbs. of ground rock or bone about 500 to 600 lbs. of sulphuric acid, diluted with an equal volume of water, will be required: these materials must be so thoroughly mixed that every particle of the rock or bone shall be acted on by the acid. The addition of the acid does not increase the quantity of plant food which the other material contained. On the contrary, it converts quite a proportion of the material into sulphate of lime (gypsum) which is of comparatively low value. But by this conversion a partial separation of the lime and the phosphatic acid is effected, the latter becomes more readily soluble in water and, consequently, is made almost immediately available for the use of plants, thus giving them an early start and promoting their growth. The proportion of soluble phosphoric acid in a fair grade of S. ranges from 10 to 20 per cent. and in a high grade has reached 39 per cent. These grades contain also 1 to 7 per cent. of phosphoric acid in a comparatively insoluble condition, and in most superphosphates a proportion (usually small) of the acid which had been made soluble 'reverts' to a state approximating that in which it first appeared. What is called 'pure' S., containing 60 to 80 per cent. of soluble phosphoric acid, is made in small quantities. The great superiority of S. over ground bones or pulverized phosphate rock, is in its separation into much more minute particles, which can be more quickly appropriated by plants; and—on account of its being easily dissolved by rain—its much more uniform distribution throughout the soil. Soon after being carried into the ground the phosphoric acid not used by plants is precipitated by the action of lime, iron, or alumina in the soil, and forms phosphates of these substances; but it is in much smaller particles than it would have been if the original materials had been merely pulverized, and is far more readily acted on by water, and by the roots of plants

than it could have been if they had not been treated with sulphuric acid. S. should be applied a short time before the seed is sown, in order that its acidity may be removed by contact with the soil. It is valuable not only for supplying plants with phosphoric acid, but also, through the aid of growing plants, for securing nitrogen from the air and liberating potash and other minerals in the soil. It varies greatly in its composition and no reliable estimate of its quality can be formed from its appearance. Its value can be determined only by chemical analysis. See PHOSPHATE ROCK.

SUPERPOSE, v. *sū'pĕr-pōz'* [F. *superposer*, to superpose—from L. *super*, above; *positus*, placed, pp. of *ponĕrĕ*, to place]: to lay or be placed upon; to lay upon, as one kind of rock upon another. SU'PERPO'SING, imp. SU'PERPOSED', pp. *-pōzd'*. SU'PERPOSI'TION, n. *-pō-zĭsh'ŭn* [F.—L.]: a lying above or upon something; that which is situated above or upon something else; in *geol.*, the order of arrangement in which strata and formations are placed above each other.

SUPERPRAISE, v. *sū'pĕr-prāz* [L. *super*, above, and *praise*]: in *OE.*, to praise beyond measure.

SUPERROYAL, a. *sū'pĕr-roy'ăl* [L. *super*, above, and *royal*]: denoting a kind of paper in sheets larger than royal.

SUPERSALT, n. *sū'pĕr-sawlt* [L. *super*, above, and *salt*]: a salt with a greater number of equivalents of acid than of base; acid salts.

SUPERSATURATE, v. *sū'pĕr-săt'ū-rāt* [L. *super*, above, and *saturate*]: to cause a liquid to dissolve an excessive quantity of a substance, such excess being held in very unstable solution.

SUPERSCRIBE, v. *sū'pĕr-skrīb'* [L. *super*, above; *scrībo*, I write]: to write or engrave on the top, outside, or surface; to write a name or address on the outside of a letter. SU'PERSCRI'BING, imp. SU'PERSCRIBED', pp. *-skrībd'*. SU'PERSCRIP'TION, n. *-skrĭp'shŭn* [L. *scriptus*, written]: the act of superscribing; that which is written or engraved on the outside or over something else; the address of a letter; an impression of letters on coins.

SUPERSEDE, v. *sū'pĕr-sēd'* [L. *super*, above; *sedĕō*, I sit]: to set aside; to make void or useless by superior power; to render unnecessary; to suspend; to overrule; to come or be set in the place of another. SU'PERSE'DING, imp. SU'PERSE'DED, pp. rendered unnecessary; displaced; suspended. SU'PERSE'DEAS, n. *-sē'dĕ-ăs* [L. set aside, stay]: in *law*, an order to suspend the powers of an officer in certain cases, or to stay proceedings. SU'PERSE'DURE, n. *-dūr*, the act of superseding; supersession.

SUPERSENSIBLE, a. *sū'pĕr-sĕn'sĭ-bl* [L. *super*, above, and *sensible*]: beyond the reach of the senses or natural powers of perception: also SU'PERSEN'SUAL, a. [*super*, and *sensual*]: above the senses.

SUPERSESSION, n. *sū'pĕr-sĕsh'ŭn* [L. *super*, above, and *session*]: the act of sitting on anything; the act of superseding.

SUPERSTITION, n. *sū'pĕr-stĭsh'ŭn* [F. *superstition*—from L. *superstitĭō* or *superstitĭōnem*, the remaining in the old obsolete belief, unreasonable religious belief—from *super*, above; *sto*, I stand]; unfounded wonder at, or dread of, the divine or supernatural; that form of religion in which fear is stronger than love and trust; excess of scruples or extravagance in religion; the belief of what is absurd or without evidence, as in the direct agency of superior or supernatural powers in certain events; belief in omens and prognostics; a false religion; false worship. SU'PERSTI'TIOUS, a. *-ŭs* [F. *superstitieux*—L.]: manifesting belief in supernatural agencies in certain events; full of idle fancies and practices in regard to religion and the unseen world; scrupulous to excess. SU'PERSTI'TIOUSLY, ad. *-lĭ*. SU'PERSTI'TIOUSNESS, n. *-nĕs*, the state or quality of being superstitious.

SUPERSTRATUM, n. *sū'pĕr-strā'tŭm* [L. *super*, above, and *stratum*]: a layer above another, or overlying something else.

SUPERSTRUCTURE, n. *sū'pĕr-strŭk'tūr* [L. *super*, above, and *structure*]: any edifice or erection built upon something else; that which is raised or built on a foundation or basis. SU'PERSTRUC'TION, n. *-shŭn*, the act of building on; a superstructure. SU'PERSTRUC'TIVE, a. *-tĭv*, built on something else.

SUPERSUBSTANTIAL, a. *sū'pĕr-sŭb-stăn'shăl* [L. *super*, above, and *substantial*]: beyond the domain of matter; more than substance.

SUPERSUBTLE, a. *sū'pĕr-sŭt'tl* [L. *super*, above, and *subtle*]: in *OE.*, oversubtle; subtle in excess.

SUPERTEMPORAL, a. *sū'pĕr-tĕm'pō-răl* [L. *super*, above, and *temporal*]: that transcends time.

SUPERTERRESTRIAL, a. *sū'pĕr-tĕr-rĕs'trĭ-ăl* [L. *super*, above, and *terrestrial*]: being above the earth, or above what belongs to the earth.

SUPERTONIC, n. *sū'pĕr-tŏn'ĭk* [L. *super*, above, and *tonic*]: in *music*, the note, in the diatonic scale, next above the key-note, and forming with it the interval of the second, as D in the key of C major.

SUPERTRAGICAL, a. *sū'pĕr-trăj'ĭ-kăl* [L. *super*, above, and *tragical*]: tragical to excess.

SUPERTUBERATION, n. *sū'pĕr-tū'bĕr-ā'shŭn* [L. *super*, over, above; *tūber*, a hump or excrescence]: in *bot.*, the growth of young potatoes from old ones still growing.

SUPERVENE, v. *sū'pĕr-vēn'* [L. *super*, above; *venĭō*, I come]: to come upon, as something extraneous; to happen to. SU'PERVE'NING, imp.: ADJ. coming as an extraneous addition. SU'PERVENED', pp. *-vēnd'*. SU'PERVE'NIENT, a. *-vē'nĭ-ĕnt*, coming upon, as something additional. SU'PERVEN'TION, a. *-vĕn'shŭn*, the act of coming upon as something extraneous.

SUPERVISE, v. *sū'pĕr-vīz'* [L. *super*, above; *visĕrĕ*, to survey—from *vidērĕ*, to see]: to oversee; to inspect; to superintend; in *OE.*, to read over; to peruse. SU'PERVI'SING, imp. SU'PERVISED', pp. *-vīzd'*. SU'PERVI'SAL, n. *-vī'zăl*, or SU'PERVI'SION, n. *-vĭzh'ŭn*, the act of overseeing; inspection. SU'PERVI'SOR, n. *-vī'zĕr*, an overseer; an inspector; a superintendent. SU'PERVI'SORY, a. *-zĕr-ĭ*, pertaining to or having supervision.

SUPERVOLUTE, a. *sū'pĕr-vō-lūt'* [L. *super*, above, and *volute*]: in *bot.*, having a plaited and rolled arrangement in the bud.

SUPINE, n. *sū'pīn* [L. *supīnus*, bent or thrown backward: It. *supino:* F. *supin*]: in *L. gram.*, an indeclinable part of the verb ending in *um* and *u*, and translated in English with 'to'—why it is so called is not very evident; an indeclinable verbal noun.

SUPINE, a. *sū-pīn'* [L. *supīnus*, bent or thrown backward, lying on the back, careless]: lying on the back, or with face upward; careless; thoughtless; negligent; inattentive; indolent. SUPINE'LY, ad. *-lĭ*. SUPINE'NESS, n. *-nĕs*, indolence; thoughtlessness. SUPINATE, a. *sū'pī-nāt*, in *bot.*, leaning or inclining with exposure to the sun. SU'PINA'TION, n. *-nā'shŭn*, the act of turning the face upward. SU'PINA'TOR, n. *-tĕr*, in *anat.*, one of those muscles which turn the palm of the hand forward or upward.—SYN. of 'supine': careless; heedless; listless; drowsy.

SUPPAWN', or SUPAWN: see SEPAWN.

SUPPED, SUPPER, SUPPERLESS, SUPPING: see under SUP.

SUPPLANT, v. *sŭp-plănt'* [F. *supplanter*, to supplant—from L. *supplantārĕ*, to trip up the heels, to overthrow—from *sub*, under; *planta*, the sole of the foot: It. *supplantare*]: to trip up the heels; hence, to take the place of, as by stratagem or unfair means; to displace; to force away; to supersede. SUPPLANT'ING, imp.: N. the act of displacing or turning out. SUPPLANT'ED, pp. SUPPLANT'ER, n. *-ĕr*, one who supplants.—SYN. of 'supplant': to overpower; remove; supersede; undermine; overthrow.

SUPPLE, a. *sŭp'pl* [F. *souple*, supple—from L. *supplex*, folding or bending the knees beneath one, a suppliant—from *sub*, under; *plĭco*, I bend or fold]: easily bent; flexible; that makes pliant; compliant; not obstinate; flattering or fawning: V. to make pliant or flexible; to train; to grow soft or pliant. SUP'PLING, imp. *-plĭng*. SUPPLED, pp. *sŭp'pld*. SUP'PLELY, ad. *-pl-lĭ*. SUP'PLENESS, n. *-nĕs*, quality of being easily bent; readiness of compliance.—SYN. of 'supple, a.': pliant; yielding; bending; flattering; soft; facile.

SUP'PLE JACK: name given in the s. United States to *Berchemia volubilis*, twining shrub of nat. order *Rhamnaceæ*, found as far n. as Virginia. It has oval leaves, small flowers, and violet-colored berries. It abounds in the Dismal Swamp and similar situations, and ascends to the tops of the highest trees. The genus *Berchemia* contains

a number of species of twining shrubs, natives of warm climates in different parts of the world.—The name S. J. is given in the W. Indies and tropical America to *Serjania* (or *Seriana*) *triternata*, shrub of nat. order *Sapindaceæ*, with long, flexile, woody stem, which climbs to the tops of the highest trees, and is used for walking-sticks. It has poisonous properties, and is employed for stupefying fish.

SUPPLEMENT, n. *sŭp'plĕ-mĕnt* [F. *supplément*—from L. *supplemen'tum*, that with which anything is made full or whole—from *sub*, under; *plēō*, I fill: It. *supplemento*, a supplement]: any addition by which defects are supplied; an addition made to a published work or book to render it more complete; an additional sheet to a newspaper; in *trig.*, the quantity by which an arc or an angle falls short of 180 degrees, or a semicircle; what must be added to an arc to make a semicircle: V. *sŭp'plĕ-mĕnt'*, to add something to make more full and complete; to add to. SUP'PLEMENT'ING, imp. SUP'PLEMENT'ED, pp. SUP'PLEMENT'AL, a. *-ăl*, added to supply deficiencies or defects; additional: also SUP'PLEMENT'ARY, a. *-ĕr-ĭ*. SUP'PLEMENT'ALLY, ad. *-lĭ*. SUPPLETORY, a. *sŭp'lĕ-tĕr-ĭ*, or SUP'PLETIVE, a. *-tĭv*, supplying deficiencies.

SUPPLIANCE, n. *sŭp-plī'ăns* [from SUPPLY]: in *OE.*, continuance. SUPPLIANT, a. *sŭp-plī'ănt* in *OE.*, furnishing a supply.

SUPPLIANCE, n. *sŭp'plĭ-ăns:* see under SUPPLIANT.

SUPPLIANT, a. *sŭp'plĭ-ănt* [F. *suppliant*, a humble petitioner—from L. *supplicans* or *supplican'tem*, beseeching; *supplĭcārĕ*, to beseech—from *sub*, under; *plico*, I fold]: asking earnestly and submissively; expressive of humble supplication; entreating: N. one who entreats humbly and submissively. SUP'PLIANCE, n. *-ăns*, entreaty; supplication. SUP'PLIANTLY, ad. *-lĭ*. SUP'PLICANT, a. *-kănt*, entreating; asking submissively: N. one who entreats submissively; a petitioner who asks earnestly. SUP'PLICATE, v. *-kāt*, to seek by earnest prayer; to beseech; to entreat. SUP'PLICATING, imp. entreating; imploring. SUP'PLICATED, pp. SUP'PLICATINGLY, ad. *-lĭ*. SUP'PLICA'TION, n. *-kā'shŭn* [F.—L.]: a humble and earnest prayer in worship; an earnest entreaty. SUP'PLICATORY, a. *-kā-tĕr-ĭ*, petitionary; humble; submissive.—SYN. of 'suppliant, a.': beseeching; suing; begging; imploring;—of 'supplicate': to ask; beg; petition; importune; solicit; crave; implore; request; adjure.

SUPPLY, v. *sŭp-plī* [L. *supplērĕ*, to make full or whole—from *sub*, under; *plēō*, I fill: F. *suppléer:* It. *supplire*]: to fill as deficiencies happen; to give or afford what is wanted; to serve instead of; to provide; to bring or furnish; to fill vacant room: N. sufficiency of things for use or want; in *Brit. parliament*, taxes, customs, etc.; necessary stores and provisions; relief of want; stock. SUPPLY'ING, imp. SUPPLIED', pp. *-plīd'*. SUPPLIES', n. plu. *-plīz'*, things supplied in sufficiency; the sums of money granted by parliament to meet the public expenditure; ways and means (see

SUPPLY, COMMITTEE OF). SUPPLI'ER, n. *-plī'ĕr*, one who supplies. SUPPLY'MENT, n. in *OE.*, prevention of deficiency. COMMISSIONERS OF SUPPLY, in *Scotland*, persons appointed by the acts imposing the land-tax to assess that tax: see VALUATIONS OF LAND: LAND-TAX. DEMAND AND SUPPLY, two important terms in political economy, the former denoting a deficiency in some article of commerce in a market, and the latter the furnishing of the article wanted.—SYN. of 'supply, v.': to provide; furnish; minister; administer; contribute; accommodate; yield; fill; afford.

SUPPLY, COMMITTEE OF: in the British house of commons, a committee of the whole, relative to the *supplies*, or sums to be granted to defray the public expenditure for the current year. All bills authorizing the expenditure of public money must originate in the house of commons, and be based on resolutions moved in a committee of supply. The house having resolved that a supply be granted to the sovereign, resolves itself into a committee of supply, to which the various estimates are submitted: this committee considers what specific grants are to be voted; and its resolutions are reported to the house, and adopted or rejected. It devolves on another committee of the house, the 'committee of ways and means,' to consider how the sums shall be raised which are voted by the committee of supply: see WAYS AND MEANS: PARLIAMENT.

SUPPORT, v. *sŭp-pōrt'* [F. *supporter*, to support—from L. *supportārĕ*, to carry or bring to a place—from *sub*, under; *porto*, I carry: It. *sopportare*]: to bear or hold up; to endure without being overcome; to undergo; to sustain; to vindicate; to prop; to maintain; to strengthen; to keep from fainting or sinking; to help; to supply with necessary funds; to substantiate; to represent, as an actor any character: N. sustaining power; the necessaries of life; food; that which upholds a person or thing from falling or sinking; assistance; aid; help; basis; the act of vindicating or maintaining. SUPPORT'ING, imp. SUPPORT'ED, pp. SUPPORT'ER, n. *-ĕr*, one who gives aid or help; a defender; an adherent; that which supports; in *her.* (see SUPPORTERS). SUPPORT'ABLE, a. *-ă-bl* [F.—L.]: that may be upheld, sustained, or endured; bearable. SUPPORT'ABLY, ad. *-ă-blĭ*. SUPPORT'ABLENESS, n. *-bl-nĕs*, the state of being supportable. SUPPORT'ANCE, n. *-ăns*, in *OE.*, maintenance; support. SUPPORT'LESS, a. *-lĕs*, without support. POINTS OF SUPPORT, the collected areas, on the plan of any structure, of the piers, walls, columns, and the like, upon which it is to rest. RIGHT OF SUPPORT, in *law*, a servitude by which an owner of a house has a right to rest his timbers on the walls of his neighbor's house.—SYN. of 'support, v.': to endure; verify; countenance; patronize; back; second; aid; succor; relieve; uphold; favor; nurture; encourage; shield; cherish; nourish; defend; protect; stay; forward; assist; sanction;—of 'support, n.': food; nutriment; sustenance; livelihood; aid; succor; maintenance; countenance; encouragement.

SUPPORTERS, in Heraldry: figures placed on each side of an armorial shield, as it were to support it. They seem to have been, in their origin, a purely decorative invention of mediæval seal-engravers, often, however, bearing allusion to the arms or descent of the bearer; but in the course of time, their use came to be regulated by authority, and they were considered indicative that the bearer was the head of a family of eminence or distinction. The usual S. are animals, real or fabulous; but men in armor are frequent, and Savages (q.v.), or naked men, often represented with clubs, and wreathed about the head and middle. There are rare instances of inanimate S. On early seals, a single supporter is frequent, and particularly in placing the escutcheon on the breast of an eagle displayed.

In England, the privilege of bearing S. as now defined belongs to the sovereign and princes of the blood, peers and peeresses, and the heads of a very few families not of the peerage, whose right is based on an ancient patent, or very early usage. Knights of the Garter and knights grand cross of the Bath are dignified with S., which, however, are not hereditary; and S. have been assigned to the principal mercantile companies of London. In Scotland, the use of S. is less restricted.

The lion and unicorn, familiar in the royal arms of the United Kingdom, were adopted, the former from the achievement of England, the latter from that of Scotland prior to the union of the crowns.

SUPPOSE, v. *sŭp-pōz'* [F. *supposer*, to suppose—from L. *supposĭtus*, placed under, substituted falsely—from *sub* under; *posĭtus*, pp. of *ponĕrĕ*, to place]: to lay down, assume, or admit without proof; to imagine; to receive as true without examination; to require to be true; to surmise: N. in *OE.*, position without proof; supposition. SUPPO'SING, imp. SUPPOSED', pp. *-pōzd':* ADJ. laid down or imagined as true; believed. SUPPO'SAL, a. *-pō'zăl*, in *OE.*, position without proof; opinion. SUPPO'SER, n. *-zĕr*, one who supposes. SUPPO'SABLE, a. *-zā-bl* [F.—L.]: that may be imagined to exist. SUPPOSITION, n. *sŭp'pō zĭsh'ŭn* [F.—L.]: the act of laying down, or admitting as true or existing, what has not been proved; belief without evidence; imagination; conjecture; hypothesis; in *music*, the transient use of discords followed by concords. SUP'POSI'TIONAL, a. *-ăl*, assumed without proof; conjectural. SUP'POSI'TIONALLY, ad. *-lĭ*. SUPPOS'ITIVE, a. *-ĭ-tĭv*, including or implying supposition: N. in *gram.*, a word implying supposition. SUPPOS'ITIVELY, ad. *-lĭ*.—SYN. of 'suppose, v.': to imagine; believe; conclude; consider; judge; view; assume; conjecture; apprehend; conceive; guess; involve; imply; presume.

SUPPOSITITIOUS, a. *sŭp-pŏz'ĭ-tĭsh'ŭs* [L. *supposĭtĭt'ĭus*, put in the place of another—from *sub*, under; *posĭtus*, placed; *ponĕrĕ*, to place]: put by trick in the place belonging to another; not genuine; spurious. SUPPOS'ITI'TIOUSLY, ad. *-lĭ*. SUPPOS'ITI'TIOUSNESS, n. *-nĕs*, the state of being supposititious.

SUPPOSITIVE: see under SUPPOSE.

SUPPOSITORY, n. *sŭp-pŏz'ĭ-tĕr-ĭ* [L. *suppositus*, placed under—from *sub*, under; *ponō*, I place]: a solid medicinal agent for introduction into the rectum.

SUPPRESS, v. *sup-prĕs'* [L. *suppressus*, held or kept back—from *sub*, under; *pressus*, pressed; *premĕrĕ*, to press]: to put down; to overpower and crush; to restrain; to keep in; not to tell or reveal; to stop; to stifle; to conceal. SUPPRES'SING, imp. SUPPRESSED', pp. *-prĕst'*: ADJ. crushed; concealed; stopped. SUPPRES'SIBLE, a. *-sĭ-bl*, that can be suppressed or concealed. SUPPRES'SOR, n. *-sŏr*, one who suppresses. SUPPRES'SION, n. *-prĕsh'ŭn* [F.—L.]: the act of crushing or destroying; the act of holding back or retaining: concealment; stoppage; in *gram.*, the omission, as of words; in *bot.*, the complete non-development of organs; in *med.*, arrest of a normal secretion (see RETENTION OF URINE). SUPPRES'SIVE, a. *-prĕs'sĭv*, that tends to suppress.—SYN. of 'suppress': to restrain; put down; overpower; overwhelm; smother; destroy; conceal; detain; retain; obstruct; subdue.

SUPPRES'SION OF VICE: see VICE, SOCIETIES FOR THE SUPPRESSION OF.

SUPPURATE, v. *sŭp'pū-rāt* [L. *suppūrātus*, pp. of *suppūrārĕ*, to gather matter underneath—from *sub*, under: *pus*, the white and viscous matter of a sore; *pūris*, of matter: It. *suppurare:* F. *suppurer*]: to generate or form white and viscous matter (Pus, q.v.), as in a sore; to cause to form matter, as a sore. SUP'PURATING, imp.: ADJ. secreting pus. SUP'PURATED, pp. SUP'PURA'TION, n. *-rā'shŭn* [F.—L.]: process of producing pus, as in a sore; the matter formed in a sore (see below). SUP'PURATIVE, a. *-tĭv*, tending to suppurate: N. medicine that promotes the forming of pus, as in a sore.

SUPPURA'TION: morbid process giving rise to the formation of Pus (q.v.) which is one of the commonest products of inflammation. The opinion formerly universal was, that pus was formed from excessive exudation of the fluid portions of the blood through the walls of the capillaries; in which exudation, under certain conditions, pus-cells were developed. This view is now rejected for the doctrine of Virchow, eminent prof. of pathology at Berlin, who maintains that pus-cells are generated from the corpuscles of areolar tissue, which he supposes to permeate nearly every portion of the body. Pus, according to Virchow, is a young tissue in which, amid the rapid development of cells, all solid intercellular substance is gradually dissolved. A single cell of areolar or connective tissue may, in an extremely short time, produce dozens of pus-cells; but the result is of no service to the body, S. being, to use his words, 'a pure process of luxuriation, by means of which superfluous parts are produced, which do not acquire that degree of consolidation or permanent connection with one another, and with the neighboring parts, which is necessary for the existence of the body.' There are two different modes of pus-formation, according as the

pus proceeds from Epithelium (q.v.) or from connective tissue (see CELLULAR TISSUE). When pus is formed from epithelium, it is produced without any considerable loss of substance, and without ulceration; but when it is formed from connective tissue, ulceration must always exist. The mucous membranes vary in their power of forming pus. A mucous membrane, according to Virchow, is the more qualified to produce pus without ulceration the more completely its epithelium is stratified, membranes with a single layer of epithelium being less adapted for production of pus. Thus the intestinal mucous membrane scarcely ever produces pus without ulceration; while other mucous membranes, containing several strata of cells, are capable of secreting enormous quantities of this fluid without the slightest ulceration, e.g., the urethral mucous membrane in gonorrhea.

The above cases of S. occur on free or exposed surfaces, and are unaccompanied with loss of tissue. Deep-seated pus-formation takes place only in connective tissue. The first stage of formation consists in enlargement of the normal cells, and a division and excessive and rapid multiplication of their nuclei. This is soon followed by division of the cells themselves, and their conversion into true pus-cells. If this process takes place beneath a surface which does not participate in the morbid change, or which is capable of resisting it for a time, an *abscess* is formed; whereas, when pus-cells are poured forth from an exposed surface, an *ulcer* is formed.

Although S. is a morbid process, it often accompanies processes of beneficial tendency (such as granulation), and frequently takes the place of other far more morbid processes. It further affords a mechanical means of removing foreign bodies, e.g., thorns, splinters of glass, etc., from soft parts into which they may have been driven; and it is possible (as some pathologists venture to believe) that the formation of abscesses may sometimes serve to eliminate morbid matters from the system.

SUPRA-, *sū'prĕ* [L. *supra*, above, beyond]: a Latin prefix signifying 'above; on the top; over; beyond.'

SUPRA-AXILLARY, a. *sū'prĕ-ăk'sĭl-lĕr-ĭ* [L. *supra*, and *axillary*]: in *bot.*, growing above the axil.

SUPRACRETACEOUS, a. *sū'prĕ-krē-tā'shŭs* [L. *supra*, upper, and *cretaceous*]: in *geol.*, applied to deposits lying over the chalk formation.

SUPRAFOLIACEOUS, a. *sū'prĕ-fō'lĭ-ā'shŭs* [L. *supra*, upper, and *foliaceous*]: in *bot.*, inserted above a leaf or petiole.

SUPRALAPSARIAN, n. *sū'prĕ-lăp-sā'rĭ-ăn* [L. *supra*, beyond; *lapsus*, a falling down or into ruins; *labor*, I fall down]: in *theol.*, one who holds that God's absolute decree of election and reprobation is antecedent to his foresight of the fall of Adam, and irrespective of it: see SUBLAPSARIAN: ADJ. pertaining to.

SUPRAMUNDANE, a. *sū'prĕ-mŭn'dān*: situated above the world, or above our system.

SUPRANATURALISTS, n. pla. *sū'prā-năt'ū-răl-ĭsts* [L. *supra*, upper, above, and *naturalists*]: in *theol.*, those who believe in supernatural manifestations in religion and in a divine revelation, in opposition to the rationalists, who exclude them; also those who adopt the system of accommodation in religious matters, and explain away tenets usually considered fundamental: see also under SUPERNATURAL.

SUPRAORBITAL, a. *sū'prā-ŏr'bĭ-tăl* [L. *supra*, upper, and *orbital*]: in *anat.*, above the orbit of the eye.

SUPRARENAL, a. *sū'prā-rē'năl* [L. *supra*, upper, and *renal*]: in *anat.*, situated above the kidneys.

SUPRARE'NAL CAP'SULES: two small, flattened, glandular bodies of yellowish color, one directly in front of the upper end of each kidney. In weight they vary from one to two drachms. They belong to the class of ductless glands, and on making a perpendicular section, each gland is seen (like the kidney) to consist of cortical and medullary substance. The blood-vessels and nerves of the glands are exceedingly numerous.

Diseases of the Supra-renal Capsules.—Attention has been drawn to the diseases of these organs from the observation of Dr. Addison (of Guy's Hospital), that such cases are frequently associated with deposition of pigment in the skin, causing it to assume a deep bronze color. The following definition of *Addison's Disease*, or *Suprarenal Melasma*, or *Bronzed Skin Disease*, embracing all the most important points in its natural history, is given by Dr. Aitken: 'A morbid state, which establishes itself with extreme insidiousness, whose characteristic features are anæmia, general languor and debility, and extreme prostration, expressed by loss of muscular power, weakness of pulse, remarkable feebleness of the heart's action, breathlessness upon slight exertion, dimness of sight, functional weakness and irritability of the stomach, and a peculiar uniform discoloration of the skin, which becomes of a brownish olive-green hue, like that of a mulatto, occurring in connection with a certain diseased condition of the supra-renal capsules. The progress of the disease is very slow, extending on an average over one year and a half, but may be prolonged over four or five. The tendency to death is by asthenia, the heart becoming utterly powerless, as if its natural stimulus—the blood—had ceased to act.'—*The Science and Practice of Medicine* (3d ed. II. 72). The numerous cases recorded by different physicians of all countries since Dr. Addison's original observations were made, show that the connection between *bronzing* of the skin and various morbid states of the suprarenal capsules is a fact beyond dispute; but the exact relationship and pathological significance of the morbid states thus connected are open questions. The special morbid changes in the capsules necessary for production of the symptoms which constitute the disease, are first the deposition of a translucent, softish substance; the degeneration of this to a yellowish-white opaque matter; and afterward a soften-

ing into an abscess, or drying up into a chalky mass. In treatment, nothing can be done but to attempt to improve the general health by nourishing food, tonics, etc. The literature of this singular disorder is mainly in memoirs in *Guy's Hospital Reports.*

SUPRASCAPULAR, a. *sū'prā-skăp'ū-lĕr* [L. *supra*, upper, and *scapular*]: in *anat.*, situated above the shoulder-blade.

SUPREM'ACY, ROYAL: term in politics, applied chiefly to authority in matters ecclesiastical. From the time of Pope Gelasius (494) to the Reformation, the pope exercised over all the churches of w. Europe a very extensive authority, judicial, legislative, and executive, undefined in its limits, varying in different countries and at different periods; which continues to be more or less recognized in all countries whose inhabitants are in communion with the Church of Rome. At the English Reformation, the papal supremacy was abolished, and act 26 Henry VIII. c. 1, declared the king and his successors the 'only supreme head on earth of the Church of England.' A curious document was at the same time drawn up by the govt., in which, to avoid misconception, it was explained that the recognition of this headship of the church implies only that the king should have such power as of right appertaineth to a king by the law of God, and that he should not take any spiritual power from spiritual ministers, or pretend to 'take any power from the successors of the apostles that was given them by God.' In 1535, the same year in which this act was passed, John Fisher, Bp of Rochester, Sir Thomas More, and others, were beheaded for denying the king's supremacy (ecclesiastical); and 1578, John Nelson, a priest, and Sherwood, a young layman, suffered death for the same offense. The assumption by Henry VIII. of the title 'Head of the Church,' notwithstanding the explanation alluded to, was much commented on; and on the accession of Elizabeth, it was thought prudent, while again claiming the supremacy in all causes, as well ecclesiastical as civil, to keep that designation in the background. By successive statutes, the requisitions concerning this oath and cognate oaths have been greatly modified. In the new short oath of allegiance (1871) the royal supremacy in matters ecclesiastical is not in express words specified: see ABJURATION, OATH OF.

SUPREME, a. *sū-prēm'* [F. *suprême*, highest—from L. *suprēmus*, highest, topmost—from *supĕrus*, high—from *super*, above: It. *supremo*]: highest; greatest; most excellent; holding the highest place in government or power; sovereign: pre-eminent. SUPREME'LY, ad. *-lĭ.* SUPREM'ACY, n. *-prĕm'ă-sĭ*, highest authority or power; sovereign and undivided authority in ecclesiastical affairs. OATH OF SUPREMACY, oath formerly taken by loyal British subjects denying the pope's supremacy and maintaining the royal prerogative in matters ecclesiastical as well as in things temporal—called the *royal supremacy:* see SUPREMACY, ROYAL.

SUR-, *sér* [F. *sur*, on, upon—from L. *super*, upper, above]: a prefix signifying 'over; in addition; above; beyond:' sometimes merely intensive.

SUR-, prefix, *sér* [L.]: form assumed by the prefix *sub* before words beginning with *r*, as *surreptitious*.

SURA, n. *só'ra* [Ar.]: a chapter of the Koran.

SURABAYA, *sō-rā-bī'ā:* leading seaport of Java, cap. of a Dutch residency; on the Kali Mâs mouth of the river Kediri, near the Strait of Madura, the citadel being in 7° 4′ 30″ s. lat. and 112° 40′ 40″ e. long. The European town is on the w. bank, five bridges connecting it with the Chinese and Javan quarters on the east. There are 2 Prot. clergymen, a Rom. Cath. priest and assistant, several govt. and adventure schools for Christian children. There are regular steamboat services to Samarang, Batavia, and other places. The govt. sugar culture in S. employs 6,000 families, and produces more than 30,000 tons per annum. The govt. coffee amounts to about 400 tons per annum.-Pop. (1880) 122,234; (1891) 118,770, 5,913 Europeans.

The *Residency* of S. comprises an extensive tract of fertile land in n.e. Java, and the island of Madura. Rice, coffee, sugar, indigo, cotton, tobacco, and cocoa-nuts are extensively cultivated. Pop. (1880) est. 1,600,000, including 5,500 Europeans, 11,000 Chinese; (1892) 2,074,362.

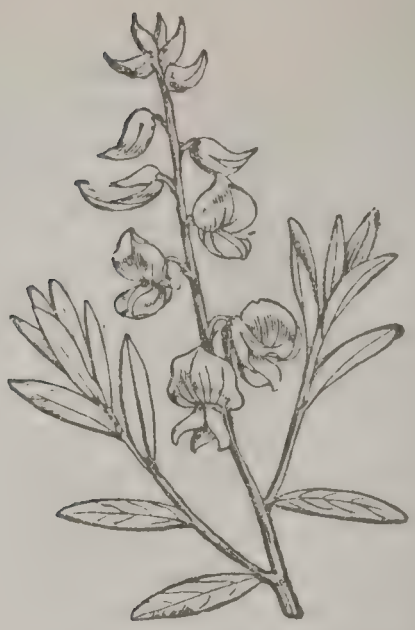
SURAH, n. *sōr'ā* [native name]: kind of silk material.

SURAKARTA, *sō-rā-kär'tā:* Dutch residency of Java, s.e. from Samarang; 2,370 sq. m. It is fertile and well cultivated, producing rice, maize, sugar, coffee, tea, indigo, tobacco, pepper, cacao, vanilla, and tropical fruits. About 4,500 tons of coffee are produced yearly. The people are proud, and less obedient than in the other residencies, but abjectly submissive to the native regent, (sometimes called emperor), though, in many things connected with his govt., he must consult the European resident. Pop. (1880) 936,384; of whom 2,387 Europeans, 6,301 Chinese. (1891) 1,167,005.

SURAKARTA, or SOLO: city in Java, cap. of the native state, and seat of the Dutch residency; on the left bank of the Solo; 7° 31′ 30″ s. lat., and 110° 46′ 7″ e. long. It covers a large space. Many princes and nobles have their palaces in S.; that of the native regent is of great extent and splendor: 10,000 persons, belonging to or in the service of the royal family, are said to live within its wall. N.e. from the royal parks is the European town, in front of which, surrounded by the parade ground, and commanding the palace, is a square fort, with broad canal and drawbridges at the four curtains, and mounted with 30 pieces of heavy artillery. There is a normal school for training Javanese teachers, a govt. school, and an adventure girls' school. A railway was completed 1870 from Samarang to S., by which an impulse was given to trade and agriculture.—Pop. (1891) 101,495.

SURAL, a. *sū'rāl* [L. *sūra*, the calf of the leg]: pertaining to the calf of the leg.

PLATE 3.



Sunn (*Crotalaria juncea*).

Surface Grub.

Surf Duck (*Oidemia perspicillata*).

SURANCE, n. *sū'răns* [see SURE]: in *OE.*, assurance; security; assistance; warrant.

SURAT, *sō-răt'* [Skr. *Saurashtra*, good country]: large city of Brit. India, cap. of the dist. of S., in the Guzerat division of the Bombay presidency; 150 m. n. of Bombay, 14 m. by river (10 m. by land) from the mouth of the Taptí in the Gulf of Cambay. It is 6 m. in circumference, surrounded landward by a brick wall. The river at S. is said to be fordable, though at high tide it floats vessels of 50 tons. The English and Portuguese factories, the former now used partly as a lunatic asylum and partly as hospital, are imposing edifices of great solidity. S. is said (possibly with exaggeration) to have contained 800,000 inhabitants at the close of the 18th c., about which time it was doubtless the most populous city in India, and its markets were crowded with the costliest wares brought by merchants from remote countries. When its trade was transferred to Bombay, its pop. declined. Its trade and manufactures, almost extinct, revived during the civil war in the United States; and it now exports cotton and grain to Bombay, and is again increasing in inhabitants. S. is a place of considerable military strength, and the residence of a Brit. milit. com. and other dignitaries. Pop. (1871) 107,149; (1881) 113,417; (1891) 108,000; (1901) 119,306.

S., though long considered one of the most ancient cities of Hindustan, is now believed to have been a mere fishing-village as late as the 13th c. It rose into importance first as the spot whence the Mohammedans of Hindustan embarked on their religious voyage to Mecca. S. was sacked 1512 by the Portuguese soon after their arrival in India. In 1612 an Eng. force in two vessels, under Capt. Best, defeated the Portuguese, and obtained a *firman* from the Mogul emperor, authorizing the residence of a Brit. minister. The Dutch trade with S. began 1616. A French factory was founded 1668. In course of time the Eng. influence began to predominate; 1759 the castle and fleet were transferred to them; and from 1800 the govt. has been in their hands.

SURBASE, n. *sĕr'bās* [F. *sur*, upon, and Eng. *base*]: in *arch.*, a cornice or series of moldings on the top of the base of a pedestal, etc. (see PEDESTAL). SURBASED, a. *sĕr'bāst*, having a series of moldings on the top of the base. SURBASE'MENT, n. *-bās'mĕnt* [F. *surbaissement*]: the depression of any arch or vault which describes a portion of an ellipse.

Surbased Arch.

SURBATE, v. *sĕr-bāt'*, or SURBEAT', v. *-bēt'* [F. *solbature*, foundering as of a horse—from *sole*, the sole of the foot; *battre*, to beat: L. *solĕa*, the sole]: in *OE.*, to bruise and batter the feet with much travelling; to harass; to fatigue. SURBA'TING, imp. SURBA'TED, pp.

SURBED, v. *sér-bĕd'* [F. *sur*, on or upon, and *bed*]: in *arch.*, to set stones on edge, or contrary to their natural bedding in the quarry. SURBED'DING, imp. SURBED'DED, pp.

SURBITON, *sér'bĭ-ton:* suburb of Kingston, Surrey, Eng.; on the Thames river, and on the London and South-western railway; 12 m. s.w. of London. It is chiefly a residence-place, but contains the headquarters and recreation grounds of the Kingston Rowing and the Thames Sailing Clubs, and a cottage hospital.—Pop. (1891) 10,052.

SURCEASE, v. *sér-sēs'* [F. *sursis*, delay—from *surseoir*, to delay, to suspend—from L. *supersèdēre*, to refrain or desist from (see SUPERSEDE)]: in *OE.*, to be at an end; to stop; to leave off; to refrain finally: N. cessation; stop or stoppage. SURCEAS'ING, imp. SURCEASED, pp. *sér-sēst'*.

SURCHARGE, v. *sér-chârj'* [F. *surcharger*, to overload —from *sur*, upon, above; *charger*, to load (see CHARGE)]: to overload; to overcharge; to overstock: N. a load greater than can be well borne, an extra charge; a disallowed item in an account which those who present it have personally to pay. SURCHARG'ING, imp. SURCHARGED', pp. *-chârjd'*.

SURCINGLE, n. *sér-sĭng'gl* [F. *sur*, over; L. *cingŭlum*, a girdle, a sword-belt—from *cingo*, I bind round]: a belt or band which passes over a saddle, or anything laid on a horse's back, in order to bind it fast; the girdle of a cassock. SURCIN'GLED, a. *-sĭng'gld*, girt or secured with a surcingle.

SURCOAT, n. *sér'kōt* [F. *sur*, over, and Eng. *coat*]: a short overcoat; the long and flowing drapery of a knight.

Surcoat.—Monument of William Longespée, Salisbury Cathedral.

SURCULUS, n. *sér'kū-lŭs*, SUR'CULI, n. plu. *-lī* [L. *surcŭlus*, a small twig]: in *bot.*, a sucker; a shoot thrown off under ground, and only rooting at its base; used also in Eng. form, SURCLE, n. *sér'kl*.

SURD, n. *sérd* [L. *surdus*, deaf, dull, indistinct]: in *alg.*, a quantity which cannot be expressed by rational numbers or exactly determined, as the square root of 2, or the cube root of 3 (see IRRATIONAL NUMBERS): ADJ. that cannot be expressed by rational numbers; in *OE.*, deaf.

SURE, a. *shôr* [F. *sûr;* OF. *seür* and *segur*, sure, safe—from L. *secūrus*, free from care, safe (see SECURE)]: certain; not liable to failure, loss, or change; firm; stable; free from doubt or danger; in *OE.*, betrothed: AD. certainly; without doubt. SURE'LY, ad. *-lĭ*, certainly; undoubtedly; without hazard. SURE'TY, n. *-tĭ*, security against loss or damage; hostage; foundation of stability; certainty; in

law, one bound with and for another; a bail; evidence (see GUARANTY, in Law): in *OE.*, ratification: V. to be security for; to guarantee. SURE'TISHIP, or SURE'TYSHIP, n. state of being surety; obligation of being bound to answer for another (see GUARANTEE). SURE'FOOTED, a. treading firmly; not liable to stumble or fall. TO BE SURE, to know certainly; to be without doubt: also used as an adv. expression; certainly; surely. TO MAKE SURE, to secure so that no failure may take place.—SYN. of 'sure, a.': unfailing; infallible; unquestioning; safe; permanent; steady; strong; secure; indisputable; confident; positive; undoubting; indubitable;—of 'surety, n.': support; hostage; bondsman; security.

SURETISHIP, SURETYSHIP, SURETY: see under SURE.

SURF, n. *sérf* [according to Skeat, the same word as *sough*, a rushing noise (see SOUGH 1: comp. Norm. *etchurfer*, to foam)]: the foaming or broken water made by the waves beating on the shore. SURF'Y, a. *-ĭ*, abounding with surf. SURF-BOAT, a light strong boat capable of passing easily and safely through heavy surf.

SURFACE, n. *sér'fās* [F. *surface*, outside—from L. *superfĭcĭēs*, the upper side of a thing—from *super*, above; *facĭēs*, the face]: the upper face or side of a thing; the outside: the upper stratum of the soil; in *geom.*, that which has length and breadth only: ADJ. on the outside; external; hollow; insincere. SUR'FACEMAN, n. in *rail.*, one who keeps the railroad track in order.

SURFACE GRUB: caterpillar of any of the common moths of the family *Noctuidæ*, of which there are more than 1,500 species in the United States, the most of them with dingy clouded fore-wings, with a 'stigma,' sometimes silvery, in the centre. The larvæ are mostly hairless. An example is the *Great Yellow Underwing Moth* (*Triphœna pronuba*), large moth, with upper wings deep brown or pale tawny, under wings bright orange with a black border. This moth abounds in hay-fields in Britain at the season of haymaking. The caterpillar, full-grown, is nearly an inch and a half long, pale green with tinge of brown, dotted with black, three pale lines down the back, and seven black spots on the inside of each of the two outer ones. It often does great mischief to roots of cabbages and turnips, and devours the roots of grass.

SURF DUCK, or SURF SCOTER, *skō'tĕr* (*Œdemia perspicillata*): species of Scoter (q.v.), extremely plentiful on the coasts of Labrador, Hudson's Bay, and other very northern parts of America, whence great numbers migrate s. in winter. It is a rare visitant of European coasts. In size it is about equal to the Mallard. The plumage is black, except two patches of white on the head and back of the neck. The bill is variegated with white, pink, and orange. It is never seen on lakes or rivers, but only on the sea-coast. It dives so quickly that it is very difficult to shoot except on the wing. Its flesh is rank, with fishy taste.

SURFEIT, n. *sĕr'fĭt* [OF. *surfait*, excess—from F. *sur*, over, and *faire*, L. *facĕrĕ*, to do]: excess in eating and drinking; sickness or satiety caused by overfulness; nausea: V. to supply with food or drink to satiety or sickness; to cloy; to be fed to overfulness or to satiety. SUR'FEITING, imp.: N. act of feeding to excess; gluttony. SUR'FEITED, pp.: ADJ. fed to a surfeit or satiety. SUR'FEITER, n. *-ĕr*, one who surfeits.

SURGE, n. *sĕrj* [OF. *sourgeon*, the spouting up of water in a fountain—from L. *surgĕrĕ*, to rise, to boil or bubble up: F. *sourdre*, to rise, to spring]: the large waves or billows; a great rolling swell of water; in *ship-building*, a certain tapered part of a capstan: V. to swell; to rise high and roll, as waves; to slip back, as a cable; to let go suddenly, as a rope. SUR'GING, imp.: ADJ. swelling and rolling, as great waves. SURGED, pp. *sĕrjd*. SURGY, a. *sĕr'jĭ*, rising in high waves or surges; full of great waves. SURGE'LESS, a. *-lĕs*, free from waves; smooth. SURGE-BEATEN, a. beaten by high rolling waves.

SURGEON, n. *sĕr'jŭn* [OF. *cirurgien;* F. *chirurgien*, a surgeon—from mid. L. *chirur'gus;* Gr. *cheirour'gos*, one who works with the hand, an operating medical man—from Gr. *cheir*, the hand, and *ergon*, work]: one whose occupation is to cure or alleviate injuries and diseases of the body by manual operations; also, a general medical practitioner. SUR'GEONCY, n. *-sĭ*, office or employment of a surgeon. SUR'GERY, n. *-jĕr-ĭ* [OF. *sirurgie*]: act or art of curing or alleviating injuries or diseases of the body by manual operations (see below): place or room in which a surgeon operates; private shop for dispensing, attached to the house of a practitioner. SUR'GICAL, a. *-jĭ-kăl*, pertaining to surgeons; done by an operation with the hand, as cutting out a tumor. SUR'GICALLY, ad. *-lĭ*.

SUR'GEON, IN UNITED STATES ARMY AND NAVY: medical officer appointed from civil life.—In the army he enters service as asst. S. with rank of 1st lieut., and while in that grade may be promoted to capt. From asst. S. he passes to S. with ranks of maj., lieut.col., and col.; S. and asst. medical purveyor with rank of lieut.col.; asst. surgeon-gen. with rank of col.; chief medical purveyor with rank of col.; and S.-gen. with rank of brig.gen. In 1891 the army medical dept. comprised 1 S.-gen., 1 chief medical purveyor, 1 asst. S.-gen., 4 surgeons (col.), 2 asst. medical purveyors, 8 surgeons (lieut.col.), 50 surgeons (maj.), 92 asst. surgeons (capt.), and 33 asst. surgeons (1st lieut.). The pay is from $1,500 per annum for 1st lieut. to $3,500 for brig.gen., with 10 per cent. increase after 5 years' service, 20 after 10 years, 30 after 15 years, and 40 after 20 years.

In the navy the medical officer enters service as asst. S. with relative rank of ensign, and by promotion may become passed asst. S. with rank of lieut.; S. with rank of lieut. and lieut.-commander; medical inspector with rank of commander; and medical director with rank of capt. In 1891 there were in the navy 15 medical directors, 15

medical inspectors, 50 surgeons and 2 not in line of promotion, 51 passed asst. surgeons, and 31 asst. surgeons. The pay is: medical directors and medical inspectors (at sea) $4,400 per annum; surgeons from $2,800 for first 5 years' service to $4,200 after 20 years; passed asst. surgeons from $2,000 for first 5 years to $2,200 after 5 years; and asst. surgeons from $1,700 for first 5 years to $1,900 after 5 years. Fleet surgeons at sea receive $4,400.

SUR'GEONS, COLLEGE OF: association (Royal College of Surgeons of England) dating its origin from 1460–1, when Edward IV. 'did, at the supplication of the freemen of the mystery of barbers of the city of London using the mystery or faculty of Surgery, grant to them that the said mystery, and all the men of the same mystery of the said city, should be one body and perpetual community.' (See BARBER: BARBER-SURGEON.) In 1500 four masters in surgery were appointed. To check unqualified persons from practicing surgery, it was enacted (1511) 'that no person within the city of London, or within seven miles of the same, shall take upon him to exercise or occupy as a physician or surgeon except he be first examined, approved, and admitted by the bishop of London, or by the dean of St. Paul's, calling to him four doctors of physic, and for surgery other expert persons in that faculty.' Hence arose a company, the Surgeons of London. In 1540 the Company of Barbers of London and the Company of Surgeons of London were united. In 1745 the surgeons of London were by act of parliament separated from the barbers, and made a distinct corporation. In 1800 this company was dissolved, and replaced with their former and additional privileges by 'The Royal College of Surgeons of London,' to which a new charter was granted 1843. The council has power to admit members, and from these, on examination, fellows: it may admit also certain classes of persons as fellows, without examination. The college is likewise empowered to test the fitness of persons to practice midwifery, and to grant certificates of such fitness; and to test the fitness of persons to practice as dentists, and to grant certificates of such fitness. There are four professorships in connection with the college—human anatomy and surgery; the Hunterian professorship of comparative anatomy and physiology; the chair of surgery and pathology; and the chair of dermatology. A Hunterian orator is appointed every second year. A candidate for membership in the college is required to pass examination in the usual branches of a liberal education. For details, see *Calendar of the Royal College of Surgeons of England.*

The museum is admirably complete: its basis was the Hunterian Collection (see HUNTER, JOHN), which was estimated to consist of 13,682 specimens: the total number of specimens exceeds 40,000. The library contains 36,000 vols. The museum and library are readily accessible to visitors. The buildings are in Lincoln's Inn Fields, London.

SURGEONS OF EDINBURGH, Royal College of: originally an assoc. of those professing 'surregerie and barbour-craft,' who obtained their first civic charter 1504, and had it confirmed by James IV. 1505. The nominal connection with the barbers was dissolved 1732. A patent of 1694 settled the relations between the surgeons and the physicians, making amicable terms possible. In 1851 the college was freed from the galling control of the town council. It sanctions the lectures of a staff of its own members as qualifying for examination candidates for its diploma of licentiate, and appoints a board of examiners.

SUR'GERY: act or art of remedial treatment of bodily injuries or diseases by manual operation. S., as distinguished from the practice of medicine, which denotes treatment of internal diseases by means of drugs, etc., is doubtless nearly as old as man himself; but its true history begins with Hippocrates, B.C. 5th c. He was acquainted with the ordinary means of counter-irritation, e.g., issues, a kind of moxa, and the actual cautery. He seems to have performed capital operations with boldness and success; he reduced dislocations and set fractures, but clumsily and cruelly; extracted the fetus with forceps when necessary; and both used and abused the trepan. He did not perform lithotomy, whose practice seems to have been then confined to a few. Two centuries after his time, at the death of Alexander the Great, Alexandria became the great school of anatomy, surgery, and medicine. Herophilus and Erasistratus, B.C. 300, were distinguished for surgical skill and anatomical knowledge. Ammianus, of this school, invented an instrument by which he broke down stones in the bladder; anticipating by about 2,000 years Civiale's discovery of lithotrity. When the great Alexandrian Library was destroyed by fire, Rome became the headquarters of all the sciences. The early Romans held surgeons and physicians in abhorrence; and trusted for cures, even in cases of dislocation and fracture, to spells and incantations. The first regular surgeon in Rome was Archagathus, B.C. 220, student of the Alexandrian school. The old prejudices soon occasioned his banishment. The first Roman surgeon of real merit was Celsus, at the beginning of the Christian era, who improved the mode of lithotomy and amputation, described the operation for cataract, and first recommended ligatures for arresting hemorrhage from wounded arteries. His works present surgical knowledge at his time. Aretæus of Cappadocia, in Rome, latter half of the 1st c., was the first to employ blisters, using cantharides (still used) for that purpose. Rufus of Ephesus, half a century later, first tied an artery which had become aneurismal from a wound in venesection. Galen, Rome, last part of the 2d c., obtained his great reputation mainly by medical practice. His S. was confined mostly to fomentations, ointments, and plasters; to bandaging; and to use of complicated machinery in fractures and dislocations. Aëtius, 6th c., recommended scarification of the legs in dropsy, tried to dissolve urinary calculi by internal remedies, studied diseases of the eye,

and is the first writer who notices the guinea-worm. Paulus Ægineta, 7th c., opened internal abscesses by caustics, improved lithotomy, described several varieties of aneurism, extirpated the breast, performed laryngotomy and tracheotomy, and originated embryotomy: his sixth book is deemed the best body of surgical knowledge previous to the revival of letters. Rhazes, Arabian in charge of a hospital at Bagdad, at the end of the 9th c., was the first to describe (but not correctly) spina bifida; he cauterized the bites of rabid animals, and gave better account of hernia than any predecessor. To Avicenna, a century later, probably is due the first use of the flexible catheter. Albucasis (d. 1122) describes an instrument for cure of fistula lachrymalis, the removal of tumors by ligatures, the suture of wounded intestines, the use of the probang in obstruction of the gullet, etc.; and is the only ancient writer who describes the instruments used in each surgical operation. In 1271 Pitard laid the foundation of the College of Surgeons of Paris. In Britain, Gilbertus Anglicanus, about the beginning of the 14th c., is the first known surgical writer. In the middle of that century, Guy de Chauliac, the first to describe the Cesarean operation, practiced at Avignon; and a contemporary was John of Ardern. During the 15th c., lithotomy was removed from the hands of itinerant quacks into the department of S., by Colot, surgeon to the French court. The College of Surgeons in England dates from this century (see SURGEONS, COLLEGE OF). In the 16th c., Ambrose Paré (q.v.) greatly advanced the profession: his works were pub. 1535. Toward the close of this century, Fabricius ab Acquapendente (q.v.), to whom is due the modern trephine, and the use of the tube in tracheotomy, published *Opera Chirurgica*, which passed through 17 editions. Wiseman (about 1660) has been termed 'the Paré of England,' and 'the true father of British surgery;' he was sergeant-surgeon to Charles II.: his works were pub. 1676. He was the first to dispel the dangerous belief that gunshot wounds were of a poisoned nature, requiring the most painful kinds of dressing. Contemporary with him were James Young of Plymouth, who first performed the flap-operation in amputation; Scultetus (a German), author of *Armamentarium Chirurgicum;* Frère St. Cosme, commonly known as Frère Jacques, French monk, who considered himself commissioned by heaven to cut for stone, and who has the merit of converting the tearing into a cutting operation; Rau of Leyden, one of the most successful lithotomists of any age, pupil of Frère Jacques; and Roonhuysen, who may be regarded as the inventor of tenotomy. The 18th c. produced, in England, White, originator of excision of joints; Cheselden and Douglas, famous lithotomists; Percival Pott, John Hunter, and Hey of Leeds; in Scotland, Monro and John Bell; in France, Petit and Desault—the former renowned for his work on Diseases of the Bones, the latter distinguished for improvements in surgical in-

struments; in Germany, Richter and the illustrious Haller; in Italy, Lancisi, Morgagni, and Scarpa.

The advance of S. in the 19th c. has been brilliant: the list of distinguished names, in various countries, is so long that only a portion can here be adduced as representative of the rest. The London medical schools show the names of Abernethy, Blizard, Brodie, Astley Cooper, Dalrymple (oculist), Earle, Guthrie and Hennen (great milit. surgeons), Aston Key, Liston, Stanley, Travers, Tyrrell (oculist), Ware (oculist), James Wilson, and many others nearly equally renowned of the earlier date; and the later names of Arnott, Bowman, Erichsen, Fergusson, Prescott Hewett, Hilton, Lane, Lawrence, Luke, Paget, Spencer Wells, and a host of others. In Edinburgh were Sir Charles Bell, Lizars, Miller, Syme, and Simpson, discoverer of the application of chloroform. Among recent improvements in practice is *antiseptic surgery*, with which the name of Joseph Lister is associated. The principle of Prof. Lister's method is the exclusion of septic matter—usually existing as germs in the atmosphere—from raw or wounded surfaces. Wounds are dressed under *carbolic acid* spray, and with other preparations of this and other antiseptic substances, with care in dressing the wound to exclude atmospheric air. The results have been surprisingly successful. Among the surgical celebrities of Dublin are Peile, Todd, Colles, Carmichael, Bellingham, Hutton, Cusack, Porter, Sir Philip Crampton, M'Dowel, Adams, R. W. Smith, and Jacob.—Barons Dupuytren and Larrey, with Amussat, Chassaignac, Civiale, Brasdor, Broca, Desmarre (oculist), Nelaton, Roux, Sichel (oculist), Velpeau, etc., have nobly advanced French surgery. Beer (oculist), Chelius, Dieffenbach, Von Gräfe (oculist), Gurlt, Jäger (oculist), Langenbeck, Stromeyer, and Wützer, are a few of the eminent surgeons of Germany. Callisen of Copenhagen, Porta of Pavia, Perogoff of St. Petersburg, may represent their respective countries. Among the many American names eminent in S. are Philip Syng Physick, 'father of American surgery;' John Rhea Barton; Valentine Mott (of whom Dr. Gross wrote: 'No surgeon living or dead ever tied so many vessels, or so successfully, for the cure of aneurism,' etc.); Ephraim McDowell, first to practice ovariotomy; Henry J. Bigelow, who showed the way to crush and remove vesical calculus at one operation; J. Marion Sims (operation for vesico-vaginal fistula); Cornelius R. Agnew (ophthalmic surgery); Samuel D. Gross; D. Hayes Agnew; Frank H. Hamilton.

S. is enlarging and advancing in such degree that even comparatively recent standard treatises can scarcely show its state of to-day in all its special departments.

With the increase of knowledge in S., as in other sciences, specialties naturally develop themselves. Diseases of the eye and of the ear, those peculiar to women and to children, and deformities (department of Orthopædic Surgery), more or less separate themselves, at least in large towns, from general S., and form special departments, of which dentistry also is considered one.

For further information, see histories of surgery by Le Clerc (1696), Freind (Lond. 1725), and Moir; those (German) by Sprengel, Bernstein, Gründer, and Häser (1865); 'Historical Notice' in Miller's *Principles of Surgery; The International Encyclopædia of Surgery,* edited by Prof. Ashurst, of Pennsylvania Univ., and containing contributions by distinguished European surgeons; Holmes, *System of S.;* Erichsen, *Science and Art of S.;* Gross, *System of Surgery.*

SURGING, SURGY: see under SURGE.

SURICATE, n. *sū'rĭ-kāt* [F. *surikate,* the African name]: a carnivorous African quadruped allied to the ichneumon, somewhat smaller than the domestic cat.

SURINAM': see GUIANA, DUTCH.

SURINAM' BARK: see ANDIRA.

SURINAM' TOAD: see TOAD.

SURLOIN, n. *sĕr'loyn:* a spelling of SIRLOIN, which see.

SURLY, a. *sĕr'lĭ* [OE. *sirly* or *sir-like,* magisterial, arrogant, compounded of *sir* and *like*]: cross; rude; uncivil; gloomily morose; snarling. SUR'LILY, ad. *-lĭ.* SUR'LINESS, n. *-nĕs,* crabbed ill-nature; moroseness.

SURMISE, v. *sĕr-mīz'* [OF. *surmise,* accusation—from *surmettre,* to lay upon, to accuse—from L. *super,* upon; *mittĕrĕ,* to send]: to imagine without certain knowledge; to suspect; to form a notion or opinion on slight evidence, or from some trivial circumstance; to conjecture: N. the notion or opinion that something exists of which we have no certain evidence; a conjecture; a supposition. SURMI'SING, imp.: N. the act of suspecting. SURMISED', pp. *-mīzd'.* SURMI'SER, n. *-mī'zĕr,* one who surmises.—SYN. of 'surmise, n.': suspicion; doubt; guess; speculation; divination; hypothesis.

SURMOUNT, v. *sĕr-mownt'* [F. *surmonter,* to excel—from *sur,* upon; *monter,* to mount—from F. *mont;* L. *mons* or *montem,* a hill]: to rise above; to overcome, as difficulties; to surpass. SURMOUNT'ING, imp. SURMOUNT'ED, pp.: ADJ. in *arch.,* applied to an arch or dome rising higher than a semicircle; in *her.,* applied to a charge over which is another charge of different color or metal. SURMOUNT'ABLE, a. *-ā-bl,* that may be overcome; superable. SURMOUNT'ABLY, ad. *-blĭ.* SURMOUNT'ABLENESS, n. *-bl-nĕs,* the state of being surmountable.—SYN. of 'surmount': to conquer; exceed; vanquish; subdue.

SURMULLET, n. *sĕr-mŭl'lĕt* [F. *surmullet*—from *saur,* yellowish brown, and *mulet,* a mullet]. (*Mullus*): genus of acanthopterous fishes of family *Mullidæ,* a small family formerly included in *Percidæ,* distinguished by having two dorsal fins widely separated from one another, the first spinous; and large, easily detached, strongly ciliated scales on head and body. The genus *Mullus* has no teeth on the upper jaw, but a disk of pavement-like teeth on the front of the vomer. Two long barbels hang from the under jaw, or, when not in use, are folded up against it. Only two species are known, both abundant in the Mediterranean. They generally receive the name MULLET, by

which they are confounded with a very different genus. The STRIPED S., or STRIPED RED MULLET (*M. surmuletus*), sometimes approaches the s. coasts of England in summer, and many are then taken in mackerel nets. It sometimes attains, in the Mediterranean, a weight of six or seven lbs.; but in Brit. seas seldom more than two lbs. The ancient Romans held it in highest esteem, and gave prodigious prices for fish unusually large. They kept surmullets in their *vivaria*. The color is pale pink, with three or four yellow longitudinal stripes; but where any of the scales have been rubbed off, beautiful tints of purple and bright red appear, as also during the struggles of the fish when dying: therefore the Romans were accustomed to bring surmullets alive into their banqueting-rooms, that the guests might see them die, and enjoy the brilliant display of color befor eating the fish. The liver was regarded as peculiarly delicious, and was bruised in wine to make a *garum* for the flesh. The S. is still regarded as one of the best of fishes.—The RED S., or PLAIN RED MULLET (*M. barbatus*), is a much smaller fish. Other species of *Mullidæ* are found in tropical seas.

SURMULOT, n. *sĕr'mū-lŏt* [F. *surmulot*—from *saur*, yellowish brown, and *mulot*, a field-mouse]: the common brown or Norway rat.

SURNAME, n. *sĕr'nām* [F. *surnom*, a surname—from *sur*, upon; *nom*, a name—from L. *nomen*, a name: It. *soprannome*]: the family name added to the baptismal or Christian name—e.g., John Smith, *Smith* being the surname, *John* the baptismal or Christian or 'given' name. The surname may have been so called from the practice of writing it *over* the Christian name, seen in the court rolls and other ancient muniments. The Roman *cognomen* partook of the same character; but the introduction of the surnames of modern time cannot be traced further back than the latter part of the 10th c.: see NAME: V. to give a surname to, or to call by one. SUR'NAMING, imp. SUR'NAMED, pp. *-nāmd*. SURNOM'INAL, a. *-nŏm'ĭ-năl*, relating to surnames.

SURPASS, v. *sĕr-pâs'* [F. *surpasser*, to overtop—from *sur*, beyond; *passer*, to pass (see PASS)]: to go beyond in anything; to excel; to exceed. SURPASS'ING, imp.: ADJ. excellent in an eminent degree; exceeding others. SURPASSED', pp. *-pâst'*. SURPASS'ABLE, a. *-pâs'sā-bl*, that may be exceeded. SURPASS'ABLY, ad. *-blĭ*. SURPASS'INGLY, ad. *-sĭng-lĭ*. SURPASS'INGNESS, n. *-nĕs*, the state of being surpassing.—SYN. of 'surpass': to excel; outdo; outstrip, transcend.

SURPLICE, n. *sĕr'plĭs* [OF. *surpeliz;* F. *surplis*, a surplice—from mid. L. *superpellic'eum*, a surplice—from L. *super*, over; *pellicĭus*, made of skins—from *pellis*, a skin]: outer, long, white linen or muslin robe, with wide sleeves, worn by officiating clergymen and choristers in the Roman and Anglican churches; also, on certain days, by students in the Eng. universities: the short S. worn by choristers is called a *cotia*. In early ages, the priests during their long services in winter wore dressed sheep-skins or furs (*pelliceæ*),

which they usually concealed by a long and full white linen robe (*super-pelliceæ*), whence the term *surplice.*—The S. in its present lengthened form (in strictness it extended only to the waist) is usually supposed to be derived from the longer and more flowing vestment, which in the Rom. Cath. Church is still used in the mass, and is called the Alb (q.v.), though in that church the S. is now worn not only by priests, but by all admitted even to the church tonsure. The S. is worn also, with the stole, by priests in administration of the sacraments; and it is worn in preaching.—The use of the S. was strongly objected to by the Calvinistic and Zwinglian Reformers on the continent, and by the Puritans in England, who regarded this vestment as a relic of popery, and made it the subject of vehement denunciations. The argument against it is in Beza, *Tractat. Theolog.*, III., 29, and its defense in Hooker's *Ecclesiastical Polity*, book V., ch. 29. Till attention to ritual became common in the Church of England and in the Prot. Episc. Church, no little stir arose from time to time from the use of the S. by the preacher in the pulpit, contrary to the then more usual practice. Preaching in the S. seems from some cause to be associated in the popular mind with a Romanizing tendency. SURPLICE, v. to robe in a surplice. SUR'PLICING, imp. SUR'PLICED, pp. *-plĭst:* ADJ. wearing a surplice.

Surplice, Brass of Prior Nelond, Cowfold, Sussex

SURPLUS, n. *sĕr'plŭs* [F. *surplus*, surplus—from F. *sur*, over, and F. and L. *plus*, more]: that which remains over beyond what is wanted; excess; what remains of an estate after debts, etc., have been paid: ADJ. exceeding what is wanted or necessary. SUR'PLUSAGE, n. *-ăj*, that which remains over; in *law*, something in the pleadings or proceedings not necessary to the case.

SURPRISE, v. *sĕr-prīz'* [F. *surprise*, surprise, astonishment—from F. *surprendre*, to take unawares—fr m L. *super*, above; *prehendĕrĕ*, to take]: to take unawares; to assail unexpectedly; to come upon one suddenly; to strike with wonder; to throw the mind into confusion by presenting something suddenly to the view or the mind: N. the act of coming upon unawares; the state of being taken unawares; an emotion of the mind excited by something happening suddenly and unexpectedly; astonishment; wonder; amazement. SURPRI'SING, imp.: ADJ. of a nature to excite wonder and astonishment; astonishing. SURPRISED', pp. *-prīzd'*. SURPRI'SINGLY, ad. *-zĭng-lĭ*. SURPRI'SAL, n. *sĕr-prī'zăl*, the act of taking unawares; sudden perplexity or confusion.—SYN. of 'surprising, a.': extraordinary; strange; curious; wonderful; astonishing; unexpected.

SURQUEDRY, n. *sĕr'kwē-drĭ*, or SUR'QUIDRY [OF. *surcuidance*, presumption; *surcuider*, to presume]: in *OE.*, overweening pride; insolence; presumption.

SURREBUTTER, n. *sĕr'rĕ-bŭt'tĕr* [F. *sur*, upon, and Eng. *rebutter*]: in *law*, the reply of a plaintiff in matters of fact to the defendant's *rebutter*. SURREJOINDER, n. *sĕr'rĕ-joyn'dĕr* [F. *sur*, upon, and Eng. *rejoinder*]: the reply of the plaintiff in matters of fact to the defendant's *rejoinder*.

SURRENDER, v. *sŭr-rĕn'dĕr* [OF. *surrendre*, to deliver up—from F. *sur*, over; *rendre*, to render (see RENDER)]: to deliver up, as one's self; to yield to the power of another; to give or deliver up; to resign; to yield to any influence; to relinquish; in *mil.*, to lay down arms and yield, as a prisoner of war: N. the act of resigning one's person, or the possession of something, into the hands of another; a yielding or giving up; in *Eng. law*, a mode of alienation of real estate, the converse of release. SURREN'DERING, imp. SURREN'DERED, pp. *-dĕrd*. SURREN'DERER, n. *-ĕr*, one who surrenders. SURREN'DEROR', n. *-dĕr-ŏr'*, in *Eng. law*, tenant who surrenders an estate into the hands of his lord. SURREN'DEREE', n. *-dĕr-ē'*, in *law*, the person to whom the lord grants surrendered land.

SURREPTITIOUS, a. *sŭr'rĕp-tĭsh'ŭs* [L. *surreptitĭus*, stolen, surreptitious—from *surrep'tus*, snatched away secretly—from *sub*, under; *raptus*, seized; *rapĕrĕ*, to seize]: done by stealth or without authority; underhand; made or introduced fraudulently. SUR'REPTI'TIOUSLY, ad. *-lĭ*, fraudulently; by stealth.

SURREY, *sŭr'ĭ* [Sax. *Suth-rice*, the south kingdom]: inland and metropolitan county in s. England; bounded n. by Middlesex, e. by Kent; 485,129 acres, or 758 sq. m. S. is traversed from w. to e. by a well-marked ridge of the North Downs, which rises in Botley Hill, above Titsey, 880 ft. On the n. side of this range, the land slopes gradually to the banks of the Thames, which skirts the n. border; but on the s. side, the descent is rugged and broken, affording pleasing and sometimes romantic scenery. South of the main range, and about four m. s. of Dorking, is Leith Hill, 993 ft. high, the most important elevation in this region. Along the s. bank of the Thames, over a space about six m. wide, is a tract which belongs to the London clay formation; further s., likewise extending from w. to e., is a tract of plastic clay, one to five m. wide. Chalk, weald clay, and iron-sand formations occupy the south. The principal streams are the Mole and Wey, tributaries of the Thames. The soil of the n. half of the county is fertile; in the w. and s.w., the land is largely covered with heath. The climate is soft and mild in low-lying districts, and is favorable to production of grain and grass. More than four-fifths of the entire area are under culture. In the n., in the vicinity of London, are numerous market-gardens, whose produce supplies the markets of the metropolis. Hops, wheat, and the ordinary crops are raised. The county contains much woodland; and the beauty of the scenery, and the facility of communication with Lon-

don, have attracted many residents to S., which is consequently studded with mansions and villas. Manufactures are carried on in Southwark and other s. suburbs of London; as well as in Croydon, Guildford, Kingston, and Reigate, the principal towns of Surrey.

Nearly two-thirds of the pop. belong to the metropolitan dist. of London (q.v.); but practically the suburbs of London occupy the greater part of the county; and the great increase in the pop. of S. (600 per cent. since the beginning of the 19th c.) is due to the establishment here of the residences of professional and business men of London.—Pop. of S. (1801) 268,233; (1871) 1,091,635; (1881) 1,436,899; (1891) 1,730,871; (1901) 2,000,000.

SUR'REY, Henry Howard, Earl of: soldier and poet: 1516(?)–1547, Jan. 19; b. England; son of the third Duke of Norfolk. He was brought up at the court of Henry VIII.; accompanied the Duke of Richmond to France; took part in the trial of Anne Boleyn 1536; and served again in France 1540. In 1544 he commanded the army in France, was promoted to field-marshal, and appointed gov. of Boulogne after its occupation. Meeting with milit. reverses 1546, Jan., he was recalled. His father, the Duke of Norfolk, was suspected of aiming at the throne; and S., being suspected of conspiracy with him, was imprisoned in the Tower; and, for quartering the royal arms with his own, was charged with treason and beheaded—the last of Henry VIII.'s many acts of tyranny. S. was a man of generous and heroic spirit, of refined and elegant manner, and of a highly cultivated mind. He translated the second and fourth books of the *Æneid*, and composed numerous sonnets, amatory poems, and paraphrases of the Bible. He was one of the heralds of the great Elizabethan movement in poetic composition.

SURROGATE, n. *sŭr'rō-gāt* [L. *surrogātus*, elected in the place of another, pp. of *surrogo*—from *sub*, under; *rogo*, I ask]: in England, deputy of an ecclesiastical judge, usually of a bishop or his chancellor; officer authorized to issue marriage licenses.—In the United States, the S. is a judge having jurisdiction in regard to the probate of wills and the appointing or confirming of administrators and guardians. But the judge holding this jurisdiction is not called S. in all the states: in some of the states he is known as probate judge, in others register, in others judge of the orphans' court, etc. The jurisdiction of the S. is ordinarily limited to his county.

SURROUND, v. *sŭr-rownd'* [F. *sur*, upon, and Eng. *round*]: to inclose on all sides; to encircle; to encompass; to fence about. Surround'ing, imp.: Adj. being on all sides of; inclosing. Surround'ed, pp. Surround'ings, n. plu. *-ĭngz*, external or attending circumstances; the environments of any place.—Syn. of 'surround': to environ; invest; hem in; circumscribe; inclose; limit; bound; include; confine.

SURSOLID, n. *sĕr-sŏl'ĭd* [F. *sur*, above, and Eng. *solid*]: in *arith.*, the fifth power of a number: ADJ. pertaining to or involving, the fifth power of a number.

SURTAX, n. *sĕr'tăks* [prefix *sur-*; Eng. *tax*]: additional or extra tax; a tax increased for a special purpose.

SURTOUT, n. *sĕr-tōt'* or *sĕr-tō'* [F. *surtout*—from F. *sur*, over; *tout*, all: mid. L. *supertōtus*, a garment put over all others—from L. *super*, over; *tōtus*, all, the whole]: *formerly*, an overcoat; *now*, a coat having a wide skirt reaching about the knees.

SURTURBRAND, n. *sĕr'tĕr-brănd* [Icel. *surtarbrandr*—from *svartr*, black, and *brandr*, a firebrand]: in *geol.*, peat-like variety of Brown Coal (q.v.) or Lignite (q.v.), occurring in the Pliocene deposits, and sometimes under the volcanic overflows in n. Iceland, and there used for fuel. It has great resemblance to the black oak found in bogs. It is capable of being made into tables and other articles of furniture, but is too brittle to be shaved by a plane.

SURVEILLANCE, n. *sĕr-vāl'yăns* [F. *surveillance*, superintendence—from *surveiller*, to watch, to have an eye upon—from L. *super*, over; *vigilārĕ*, to watch]. oversight; watch; inspection.

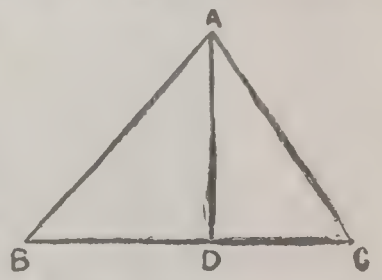
SURVEY, v. *sĕr-vā'* [OF. *surveoir*, to oversee—from L. *super*, over; *vidērĕ*, to see, to overlook]: to overlook; to inspect; to view with attention, as from a height; to oversee; to measure, as land; to examine attentively a district of country with the view of determining its area, the distances between the most prominent objects, the best possible track for a railway or canal, etc.; to examine a line of coast; in *OE.*, to perceive. SURVEY, n. *sĕr'vā*, an attentive view; an examination of all the parts and particulars; the operation of examining attentively a district of country, a line of coast, a sea, etc., with the view of determining distances, the bearing of objects, etc. SURVEY'ING, imp.: N. act or art of measuring land, laying down tracks, taking the bearings of objects, etc., in any district of country (see below). SURVEYED', pp. *-vād'*. SURVEY'OR, n. *-ĕr*, one appointed to superintend others; one who surveys a district of country, etc.; one who views and examines for a particular purpose; a government officer, as the surveyor of taxes. SURVEY'ORSHIP, n. the office of a surveyor. LAND-SURVEYING, the art of measuring and laying out plans of lands or estates. SURVEYOR-GENERAL, a chief or head surveyor. TRIGONOMETRICAL SURVEY, a survey on a large scale by means of a series of triangles.—SYN. of 'survey, n.': review; inspection; retrospect; examination; prospect; landscape.

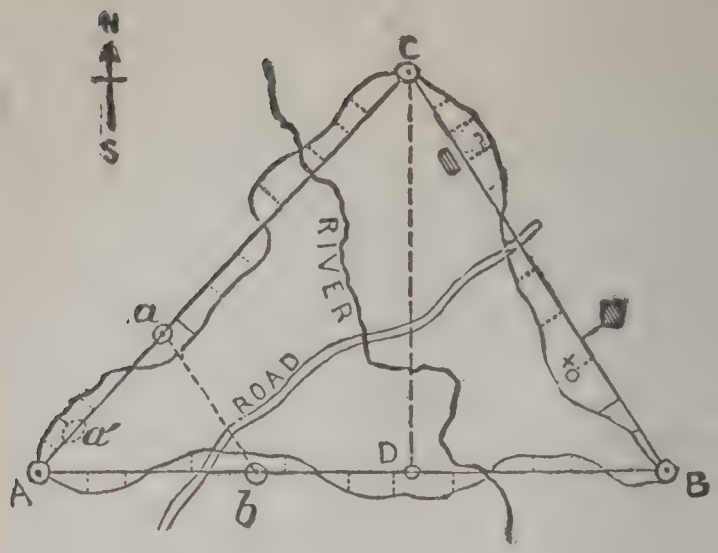
SURVEY'ING: act or art of determining relative positions of notable points on a surface, as of land, and delineating with due measurements the area included. Land S. may be considered the earliest practical application of the art of geometry or earth measurement; and must have been in some rude form coeval with agriculture and the division or appropriation of the soil. In Rome, S. was one of the liberal arts; and the measurement of lands was intrusted to public officials; and the system practiced by them was probably similar to our plain S. with the chain and cross-staff, and has been handed down to us through the feudal period. Ancient records and title-deeds show areas and boundary-lines of inclosures forming fields, hundreds, town-lands, etc., often laid down with considerable accuracy.

Land S. may be considered under the following heads: (*a*) Plain S. with the chain, and without angular instruments except the cross-staff or fixed angle of 90°. (*b*) Modern engineering S., in which angular instruments are used. (*c*) Coast and military S. (*d*) Trigonometrical S. (q.v.).

The fundamental rule of every description of land S.—from the humble attempt to lay down an irregular garden-plot, to the trigonometrical survey of a large extent of the earth's surface for which the most refined improvements of modern science are indispensable—is simply to determine three elements of a triangle, and thence to calculate its area.

In plain S. with the chain, the three sides of the triangle, ABC, are supposed to be accessible, and are carefully measured on the ground, and then laid down or platted to scale on paper, when an accurate figure of the triangle will be obtained, on which the length of the sides can be marked. To get the area, however, it will be necessary to determine the length of the perpendicular line AD, and this is usually done (when possible) on the ground by means of a simple instrument called a cross, which consists of two sights or fine grooves at right angles to each other, and being placed on the line BC (keeping B and C visible in one of the sights), nearly opposite the angle A, is moved gradually till the angle A is intersected by the other sight. The line AD also can be laid down on the drawing, and its length found by scale, and afterward verified on the ground, or it may be at once laid down on the ground by use of the chain alone. An improved reflecting instrument, called an optical square, is often used for this purpose. Any boundaries along the lines or sides of the triangle, ABC, can be determined by the use of Offsets (q.v.) or insets, as they occur on right and left of line. No matter what the form of the surface to be surveyed may be—polygon, trapezium, or trapezoid—it may thus be determined by a judicious subdivision into tri-





PAGE 1.

To ⊙ C
1500
1400 — 6
1200 — 13
0 8 — 1000 — 20
900 — 12 — Fence.
800 — Road.
700
8 — 600
10 — 500 — 20·0
400 — 10
Mill 8 ft. from line. — 16 — 300
8 — 200
5 — 100
0

From B — L ⊙ B — go to C.

To ⊙ B
2075
1950 — 12
1900 — 15 — Fence.
1800
9 — 1600
8 — 1500
1380 — Fence.
1360 — Stream crosses.
1300 — 6 — Here perpendicular D intersects.
1275 — 8
1100 — 12
1000 — 6 — Fence.
900
800
8 — 700 — b, for proof.
600 — Road crosses.
10 — 500
400 — Fence.
350 — 12
220 — 14
000

From A — Go to B.

PAGE 2.

To ⊙ C
1274

Road.
500
486 — Stream.

From D on A — ⊙ — to C.

To ⊙ A
1800
0 — 1700 — 5 — Here a gravel pit, a', 10 ft. diam.
1600 — 4
1500 — 7
1400 — 6
1300
6 — 1200
8 — 1100
12 — 1000
9 — 900
8 — 800
6 — 700 — Fence.
525' to a — 600
500 — 18 — Stream.
400
300 — 5
200 — 6
100 — 8
000

From C — L ⊙ C — go to A.

The line *ab* may be similarly booked and platted, and any lines intersecting shown.

angles; and when the survey is not very extended, and when no serious obstructions exist, chain S. is both accurate and expeditious, especially if proof or tie lines are properly introduced for testing the accuracy of the work.

In every kind of S. it is best to make the original triangle as large as possible, and to work from a whole downward, rather than build up a large triangle by addition of several small ones. Many difficulties arise in the practice of S.; and the best test of a good surveyor is the ease with which he overcomes local obstructions, which appear almost insurmountable to a novice, or even to a theoretical surveyor with little field-practice.

Where buildings or other impediments are found in the measurement of a straight line, they are generally passed by the erection of short perpendiculars sufficient to clear the obstacles, and a line parallel to the original measured as far as they exist, after which the original line can be resumed. Differences of level, occurring in measuring a line where no instruments are used, are generally compensated or allowed for by the judgment of the surveyor.

In registering the dimensions taken on the ground, such as sides of triangles, offsets, intersections of roads, fences, etc., and everything necessary to make a perfect delineation or plan of the surface, surveyors use a field-book, the mode of keeping which varies with individual practice. Some surveyors use hand-sketches or rough outlines of the form of the ground, and mark the dimensions on them; while others use the ordinary form of field-book, or a combination of the two methods, which perhaps is the best when there are difficult complications, such as buildings, inclosures, water, etc., along the line. In the ordinary field-book, the centre column, beginning from the bottom, represents the length of any line or side of a triangle; and the figures in the column, the distance at which the offsets to the right or left are taken, or where roads, streams, fences, etc., cross the line, or buildings adjoin it. We give above the field-book of the assumed survey of the triangle, ABC, with the different offsets and insets on its sides, and where roads, fences, streams, etc., cross them, the detail of which can be obtained by subdividing the triangle into smaller internal ones. The figure can thus be laid down from the book, and its area calculated by the formula $\frac{AB \times CD}{2}$, and the offsets and insets calculated, added, or deducted, by the methods given in OFFSET.

Ponds, plantations, and inclosures of different kinds may be surveyed with a chain, especially if their form be such that they can be conveniently included in the area of a triangle, the correctness of which being proved by proper tie-lines, the form, area, etc., may be ascertained by offsets, or rather insets from the sides.

SURVEYS, Military or Governmental: see (for various countries) Ordnance Survey: Coast and Geodetic Survey, United States: Geodesy: Hydrography: Triangulation.

SURVIVE, v. *sĕr-vīv'* [F. *survivre*, to survive—from L. *supervivĕrĕ*, to outlive—from *super*, over; *vivo*, I live]: to live beyond another; to outlive, as a person or thing; to remain alive. Survi'ving, imp.: Adj. remaining alive. Survived', pp. *-vīvd'*. Survival, n. *sĕr-vī'văl*, a living beyond the life of another; in *archæol.*, any habit, usage, or belief remaining from ancient times, whose origin is often unknown, or but imperfectly known. Survi'vor, n. *-vĕr*, one who outlives another. Survi'vorship, n. state of outliving another; in *law*, the right belonging to one of two or more persons, who have a joint interest in an estate, to take possession on the death of the other or others.

SÛRYA, *sûr'ya:* in Hindu myth., the god of the sun. His wife is, in later mythology, *Sûryâ*, who became mother by him of the twin *As'wins*, afterward the heavenly physicians. Besides Sûryâ, he had several other wives, by some of whom he became ancestor of a royal dynasty, called after him *Sûryavans'a*, or the solar race.

SUS-, *sŭs* [L. *sub*]: a prefix, a form of Sub, which see.

SUS, n. *sŭs* [L.; Gr. *hus;* OHG. *sû*, a pig, a swine]: in *zool.*, typical genus of family *Suidæ* or the sub-family *Suinæ:* see Hog (genus).

SUS, *sŏs:* territory in Morocco, bounded n. by the Atlas Mountains, e. by Draa, s. by the Asaka river, w. by the Atlantic Ocean; about 11,500 sq. m. It has a mountainous surface, generally good soil, and healthful climate; produces the principal cereals, dates, olives, figs, almonds, grapes, copper, lead, and other minerals; and is peopled by Berbers and Arabs, who are remarkably temperate in habits, but warlike under provocation. The chief city is Tarudant, which is surrounded by a wall with five gates. —Pop. of terr. (estimated) 750,000.

SUSA, *sō'sâ:* city of n. Italy, province of Turin, on the right bank of the Dora Riparia, at the foot of the Cottian Alps, 32 m. w. of Turin. It is an episcopal see, and has a cathedral consecrated 1028, with a baptistery of a single block of green marble. Among its other notable buildings are the episcopal palace, the town-hall, and the Borgo de' Nobili. The surrounding country produces wines, fruits, mulberry-trees, and wood. The road over Mont Cenis, opened 1810, begins at S. Pop. (1881) 3,305.

S., called by the Romans *Segusio*, is a very ancient city; it was founded by the Celts, and was in the reign of Augustus the cap. of the Celtic chief Cottius, from whom the Cottian Alps were named; and during the empire was the starting-point for crossing Mont Cenis. A triumphal arch remains, erected by Cottius in honor of Augustus.

SUSA, *sū'sa* [Shushan in Daniel, Esther, etc., derived by some from *shoshan*, a lily]: probably the modern Sus or Shusn, lat. 32° 10′ n., and long. 48° 26′ e.; between the river Chapses or Eulæus (Ulai in Daniel) and the Shapur; anciently the vast and populous capital of Susiana (*Elam* [q.v.] of Scripture, mod. *Khusistan*), one of the most important cities of the ancient world. Its foundation is variously ascribed by writers in antiquity to Darius Hystaspes, or to Memnon, son of Tithonus; and its name, with its ground-plan, is traced on Assyrian monuments at the time of Assur-bani-pal, about B.C. 660. At the time of Daniel's vision 'at Shushan in the palace' (Dan. viii. 2), it was under Babylonian dominion, but came, at the time of Cyrus, under Persian rule; and the Achæmenian kings raised it to the dignity of a metropolis of the whole Persian empire; and Æschylus, Herodotus, Ctesias, Strabo, etc., speak of it as such. At the Macedonian conquest it was still at its height, and Alexander is reported to have found in it vast treasures, with the regalia. After Babylon became the principal city of Alexander and his successors, S. gradually declined, but seems still to have contained enormous wealth at the time of its conquest by Antigonus, B.C. 315. It was attacked by Molo in his rebellion against Antiochus the Great; and during the Arabian conquest of Persia it long held out, bravely defended by Hormuzan. The ruins of its ancient buildings, the palace described in Esther among them, cover about three m.: Greek writers assign to it, with probability, an area of 15 or 20 m. The principal remains consist of four spacious artificial platforms more than 100 ft. high. Traces of a gigantic colonnade with frontage of 343 ft. and depth of 244 were laid bare by Loftus. Cuneiform inscriptions exist, with many other relics similar to those at Persepolis (q.v.: see also CUNEIFORM). The 'tomb of Daniel' shown near S. is a modern Mohammedan building.

SUSANNAH, *sō-zăn'na*, HISTORY OF; or *The Judgment of Daniel*, also *Susannah and the Elders*: titles of a well-known story, one of three apocryphal additions to the Book of Daniel; the other two being *The Song of the Three Holy Children*, and *The History of Bel and the Dragon* (q.v.). It relates how S., wife of Joiachim, and daughter of Hilkiah, celebrated alike for beauty and virtue, was falsely accused of adultery by certain 'lovers' whose advances she had spurned; and how, being condemned to death on their evidence, she was saved by the wise Daniel, who exposed her enemies, and caused them to suffer the fate that they had designed for her. The most probable view of the book regards it as a tradition of some occurrence in the life of Daniel, which has been molded into a moral fiction by a literary artist. The original has from early times been believed to have been Greek and not Hebrew. In most MSS. it precedes the first chapter of the Book of Daniel, and so we find it in the old Latin and Arabic versions; but the LXX., the Vulgate, the Complutensian Polygot, and the Hexaplar Syriac place it at the end of the present Book of Daniel, and reckon it chap. xiii.

SUSCEPTIBLE, a. *sŭs-sĕp'tĭ-bl* [F. *susceptible*, susceptible—from mid. L. *susceptib'ĭlĭs*, ready to undertake—from L. *suscep'tus*, taken hold of, sustained—from *sub*, under; *captus*, taken; *capĕrĕ*, to take]: capable of admitting anything additional, as pain or love; that may receive some change, influence, passion, etc.; tender; impressible; sensitive. SUSCEP'TIBLY, ad. *-tĭ-blĭ*. SUSCEP'TIBLENESS, n. *-blnĕs*, or SUSCEP'TIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of admitting something additional; the being capable of receiving some change, influence, affection, or passion; impressibility. SUSCEP'TIVE, a. *-tĭv*, readily admitting.—SYN. of 'susceptibility': feeling; sensation; perception; capability; sensibility; emotion.

SUSCITATE, v. *sŭs'sĭ-tāt* [L. *suscĭtātus*, pp. of *suscitārĕ*, to rouse up—from *sus* for *sub*, under; *cito*, I rouse]: in *OE.*, to rouse; to call into life and action. SUS'CITATING, imp. SUS'CITATED, pp. SUS'CITA'TION, n. *-tā'shŭn*, in *OE.*, the act of calling into life and action.

SUSIA'NA: see ELAM.

SUSLIK, n. *sŭs'lĭk* [Russ.]: the variegated or earless marmot.

Suslik (*Spermophilus citillus*).

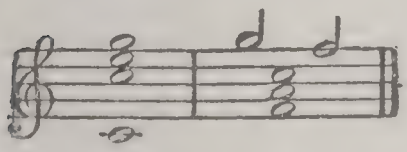
SUSPECT, v. *sŭs-pĕkt'* [F. *suspect*, suspected—from L. *suspectus*, looked at from beneath, mistrusted—from *sub*, under; *spectus*, looked at; *specĕrĕ*, to look at]: to imagine or be of opinion that something exists, but without positive evidence; to doubt; to distrust; to surmise; to imagine to be guilty: N. a doubtful or suspected person; in *OE*, suspicion; something suspicious. SUSPECT'ING, imp. SUSPECT'ED, pp.: ADJ. imagined without proof; mistrusted. SUSPECT'EDLY, ad. *-lĭ*. SUSPECT'EDNESS, n. *-nĕs*, the state of being suspected or doubted.

SUSPEND, v. *sŭs-pĕnd'* [F. *suspendre*—from L. *suspendĕrĕ*, to suspend—from *sub*, under; *pendĕrĕ*, to hang downward: It. *sospendere*]: to make to hang; to make to depend upon; to attach to something above; to cause to cease for a time; to interrupt; to keep in an undetermined state, as the judgment; to deprive of any privilege or office for a time. SUSPEND'ING, imp. SUSPEND'ED, pp.: ADJ. caused to cease for a time; held undissolved in a fluid; held undetermined; in *bot.*, applied to an ovule hanging from a point a little below the apex of the ovary. SUSPEND'ERS, n. plu. *-ĕrz*, straps for holding up trousers; braces; supports from which things may hang. TO SUSPEND PAYMENT, to cease

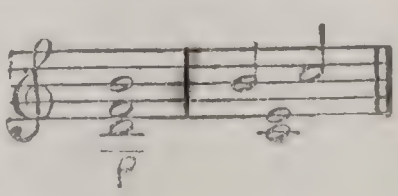
to meet engagements, as a trader or company; to become bankrupt.—SYN. of 'suspend': to delay; hang; intermit; debar; stay; hinder; stop; withhold.

SUSPENSE, n. *sŭs-pĕns'* [L. *suspensus*, pp. of *suspendĕrĕ*, to hang up (see SUSPEND)]: a state of uncertainty; the act of withholding the judgment; doubt; indecision; cessation for a time: ADJ. in *OE.*, held in doubt or expectation; held from proceeding. SUSPEN'SIBLE, a. *-pĕn'sĭ-bl*, that may be suspended or held from sinking. SUSPEN'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the capacity of being suspended, or sustained from sinking. SUSPEN'SION, n. *-shŭn* [F.—L.]: the act of hanging up, or causing to hang from, by attaching to something above; act of delaying or withholding, as the judgment; cessation for a time; delay; interruption; intermission; the depriving for a time of power, privilege, or office; the state in which the particles of a solid body are held undissolved in a fluid; in *music* (see below). SUSPEN'SOR, n. *-sĕr*, in *surg.*, a bandage to suspend the scrotum; in *bot.*, the cord which suspends the embryo within the ovule and is attached to the radicle. SUS'PENSO'RIUM, n. *-sō'rĭ-ŭm*, the apparatus by which the lower jaw is suspended to the upper jaw. SUSPEN'SORY, a. *-sĕr-ĭ*, that suspends; doubtful: N. that which suspends. SUSPENSE ACCOUNT, a lot of bad and doubtful debts collected into one account by a commercial house, or a bank, to be wiped off by certain annual deductions out of profits. SUSPENSION OF ARMS, short truce or cessation of hostile operations, agreed on by contending parties or armies in war, as for burying the dead (see TRUCE). SUSPENSION AND INTERDICT, in *Scots law*, process by which one party seeks to prevent another performing some act, or in general to stay any unlawful proceeding.

SUSPEN'SION, in Music: continuance of a note from one chord to another to which it does not properly belong, and to a proper interval of which it must eventually give way. Thus we have here the note G extended from the first chord into the second, in which it is first suspended, and then resolved into the chord FACF:



. This example is a suspension from above, in which a descent is necessary for its resolution; but a note may be suspended also from below, when it is resolved by an ascent:



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SUSPEN'SION BRIDGE: former village, Niagara co., N. Y.; on Niagara river, 1½ m. below the Falls; and on the Erie, the Grand Trunk, the Michigan Central, the New York Central and Hudson River, and the Rome Watertown and Ogdensburg railroads. It was named from a great railroad suspension bridge across the river, 800 ft. long, 24 ft. wide, with rail tracks and carriageways, since replaced by two others. The Niagara Cantilever Bridge, finished 1883, is another notable structure at this place: see BRIDGE.—The village has U. S. custom-house and post-office, 9 hotels, some factories, and 2 newspapers. Pop. (1890) 4,405. Incorporated with Niagara Falls 1892.

SUSPENSION BRIDGES: bridges in which the roadway is suspended from wire cables, or chains, passing over piers or towers, and firmly anchored at their extremities.

Fig. 1.

When the roadway is equally loaded over its length, the curve of the cable is a parabola. The weight of the roadway being known, the strain on the cable, and its requisite

Fig. 2.

strength, are readily determined. E.g., in Fig. 2, if A be the centre of the bridge, and it be required to find the strain on the cable at the point B, it is evident that the weight of the roadway between A and B is supported by the cable at B; we have then to find what strain, in the direction of the length of the cable, will support this vertical load. By the principles of mechanics, if we draw a right-angled triangle BCD, of which the side BC is a tangent to the curve at B, CD is vertical, and BD horizontal; and if the length of CD represent numerically the load on AB, then BC will represent numerically the strain on the cable produced by that load, and BD will be what is called the horizontal component of this strain. This horizontal part of the strain is the same for every part of the curve; it is the total strain on the cable at the centre A, and the strain carried over the towers and balanced by the backstays, which are firmly anchored to the ground behind them. In this manner the conditions of strength and stability of a bridge uniformly loaded are easily determined; but when we have a rolling load heavy in proportion to the weight of the bridge, e.g., a railway train, the case is very different; for when the train occupies only one-half of the bridge, the cable will be depressed toward that side, and raised at the centre; thus an undulation will

be produced in the bridge, which, if the train move rapidly, would endanger its stability. Various combinations have been devised to overcome this difficulty. The most simple, and practically the best, is to stiffen the roadway so that the strain of the passing load is distributed over a considerable length of the cable. In this manner great railway bridges have been constructed. An ordinary suspension bridge is liable to both vertical and horizontal oscillations, the former when a train or other load is passing over it, and the latter due to action of the wind. These oscillations cannot be altogether prevented, but can be so reduced as to be harmless, by use of stays, stretching from the towers and from points on shore to various parts of the bridge. Suspension bridges are generally used in positions where the span is great, and the rolling loads neither great in proportion to the weight of the bridge itself, nor very rapid in their motion.

Many beautiful examples have been constructed in the United States; among them, one at Niagara Falls (built 1852–55); between Cincinnati and Covington (1867), and Cincinnati and Newport (1854); the Roebling Bridge (1845) and the 'Point Bridge'—a chain-structure stiffened by a truss hinged at the towers and centre—at Pittsburgh; and chiefly the East River Bridge between New York and Brooklyn. See BRIDGE. Among such bridges in England are the Menai Bridge, 580 ft. span, and the Clifton Bridge, near Bristol, 703 ft. span. The Cantilever Bridge (q.v.) is perhaps growing more in favor in the United States, England, and Scotland.

SUSPICION, n. *sŭs-pĭsh'ŭn* [F. *suspicion*—from L. *suspicĭō* or *suspiciōnem*, mistrust—from *sub*, under; *specĭō*, I look at]: act of suspecting; imagination of the existence of something upon little or no evidence; doubt; mistrust. SUSPI'CIOUS, a. *-ŭs*, apt to imagine with little or no reason; distrustful; liable or open to suspicion; exciting suspicion; questionable. SUSPI'CIOUSLY, ad. *-lĭ*. SUSPI'CIOUSNESS, n. *-nĕs*, the quality or state of being suspicious; tendency to suspicion.—SYN. of 'suspicion': diffidence; distrust; misgiving; fear; jealousy; question.

SUSPIRE, v. *sŭs-pīr'* [L. *suspīrārĕ*, to draw a deep breath, to heave a sigh—from *sub*, under; *spīrārĕ*, to breathe]: in *OE.*, to fetch a deep breath; to sigh; to breathe. SUSPI'RING, imp. SUSPIRED', pp. *-pīrd'*. SUSPI'RAL, a. *-pī'răl*, a spring of water under the ground supplying a cistern or conduit; a breathing-vent. SUSPIRA'TION, n. *-rā'shŭn*, a deep-drawn breath; a sigh.

SUSQUEHANNA, *sŭs-kwē-hăn'a*, RIVER: stream having its source in Otsego and Canandaigua lakes, w. N. Y. It flows e.; receives the rivers Unadilla and Chenango; then, turning s., enters Penn., where it receives the Pittston, the Tioga, the West Branch, and the Juniata; and enters Chesapeake Bay, at Havre de Grace, Md., 400 m. from its source, and 153 from its junction with the West Branch. It is a shallow, rapid, mountain river, with varied and romantic scenery. A canal follows its course,

and great quantities of timber are floated down in the spring freshets. Near the mouth, it is famous for water-fowl, especially the Canvas-back Duck; and has important fisheries.

SUSRUTA, *sûs'rû-ta:* one of the great medical authorities of ancient India: see SANSKRIT LITERATURE—*Medicine.* His work, called *Ayurveda,* was edited in 2 vols. (Calcutta 1835–6).

SUSSEX, *sŭs'ĕks* (South-Saxons): maritime county in s. England, bounded n. by Surrey and Kent, w. by Hampshire; 76 m. long, 28 m. wide; 1,458 sq. m., or 933,269 acres. The South Downs (see DOWNS) traverse the county from w. to e., ending about 20 m. e. of Brighton, in the lofty cliff of Beachy Head. The n. escarpment of the Downs is precipitous, but leads down to the fertile and richly wooded district of the Weald (see DOWNS). A remarkably productive tract, two to seven m. in breadth, extends w. from Brighton along the coast to the Hampshire border; and in the s.e. the rich marsh-lands, 30,000 acres in extent, that line the coast, give excellent pasture. The Downland, about 50,000 acres, is covered with fine, short, and delicate turf, on which the well-known breed of Southdown sheep are pastured to the number of 300,000. Of the Weald district, formerly covered with dense forests, there are within the county 425,000 acres; a considerable tract has been brought under cultivation. Irrespective of less productive districts, there are in the county 120,000 acres of rich arable land; 150,000 acres are woodland, chiefly in the Weald, and in the Forest Ridge in n.e. S., where are St. Leonard's Forest (10,000 acres) and Ashdown Forest (18,000 acres). The chief rivers are the Arun, Adur, and Ouse, which rise in the n., and flow s. into the Channel. In the s. the climate is mild; and several large towns (see BRIGHTON: HASTINGS) are favorite resorts for seekers of health or relaxation. Seaford and Pevensey Bays are frequented by vessels; and the e. portion of the coast is defended by martello towers. The county has for centuries been divided into the six rapes of Lewes, Pevensey, Hastings, Chichester, Arundel, and Bramber; cap., Chichester. —Pop. of county: (1891) 550,442; (1901) 413,232.

SUSTAIN, v. *sŭs-tān'* [OF. *sustenir*—from L. *sustinēre,* to uphold—from *sub,* under; *tenĕō,* I hold: F. *soutenir*]: to bear or hold up; to keep from falling; to keep alive; to keep suspended; to maintain; to suffer, as a loss; in *music,* to continue the full time, as a note: N. in *OE.,* that which sustains or supports. SUSTAIN'ING, imp.: ADJ. bearing; upholding; suffering. SUSTAINED', pp. *-tānd':* ADJ. uniform; in *music,* prolonged, as a note. SUSTAIN'ER, n. *-ĕr,* he who or that which sustains. SUSTAIN'ABLE, a. *-ă-bl,* that may be sustained.—SYN. of 'sustain, v.': to prop; bear; support; keep; help; relieve; assist; endure; uphold; subsist; undergo.

SUSTENANCE, n. *sŭs'tĕ-năns* [OF. *sustenance*, sustenance (see SUSTAIN)]: support; food; victuals. SUS'TENTA'TION, n. *-tĕn-tā'shŭn* [L. *sustentātĭōnem*]: support; subsistence; that which supports; maintenance: see SUSTENTATION FUND.

SUSTENTACULAR, a. *sŭs'tĕn-tăk'ū-lĕr* [L. *sustentācŭlum*, a prop, a support; *susten'tus*, sustained (see SUSTAIN)]: applied to a kind of connective tissue which serves as a supporting framework to the elements and nourishing blood-vessels of certain organs and tissues.

SUSTENTATION: see under SUSTENANCE.

SUSTENTA'TION FUND, in the Free Church of Scotland: fund for support of its ministers. The system of the Wesleyan Methodists probably suggested the idea to Dr. Chalmers, who devised the scheme, which has continued in operation throughout Scotland. The members of the church are expected to contribute, according to their own will and ability, to a common fund; of which—after payment of expenses, payments to a fund for widows and orphans, pensions to retired ministers, etc.—an equal division is made among the ministers of the church, with a few exceptions, chiefly of newly formed congregations. The amount of the fund has gradually increased from £68,704 (about $334,300) in 1843–4, to £172,408 (about $838,800) in 1880, when out of 1,097 ministers 796 received an equal dividend of £160 (about $780) each, the surplus being divided among the ministers (780) of those charges whose contributions amounted to a certain average sum per member. Congregations are permitted to supplement the stipends of their own ministers, and if able are expected to do so: this supplement in some congregations in towns much exceeds the dividend from the fund; but in many parts of the country the whole or almost the whole stipends of the minsters are paid from the fund.

SUTHERLAND, *sŭth'ĕr-land:* county in the extreme n. of Scotland; bounded e. by Caithness and the North Sea, n. and w. by the Atlantic, s. by Ross and Cromarty; 1,297,846 acres. The coast-line is 60 m. in extent; and the shores, rugged on the n. and w., where they are broken by the force of the Atlantic, are comparatively flat on the east. The s. and central regions of S. are the most elevated. The principal mountain peaks are Ben More, in Assynt (3,273 ft.), and Ben Clibrigg (3,158 ft.). The chief rivers are the Oikel and the Shin. Extensive moors, haunt of herds of red deer, stretch across the county; and the rivers and lakes, the chief of which is Loch Shin (q.v.), form numerous low-lying valleys or straths. In the interior and w. districts, the climate is cold, and the county is often deluged with continuous rains; but in the e. districts the climate is mild, and the soil fertile. In 1880 there were 30,151 acres under crops. Coal, granites of various colors, marble, limestone, etc., are found. The Highland railway passes through the county. Manufactures are inconsiderable. There are good salmon, herring, and white fisheries. S. is well supplied with churches. The schools

are well attended, and Gaelic has largely given place to English. Almost the whole of the county belongs to the Duke of Sutherland. The present duke is eminent for his zeal in the improvement of S., spending large sums in reclamation of land, construction of railways, etc.

S. received its name from the Northmen, who frequently descended upon and pillaged it prior to the 12th c., and called it the Southern Land, as being the s. limit of their settlements. The condition of the people of S. before 1811 was miserable. Their sustenance was very precarious and often was dependent on charity. A former Duke of Sutherland effected the 'Sutherland Clearances,' by compelling such of his tenants as could not support themselves either to remove to other districts, where they received land at a merely nominal rent, or to emigrate at his expense to Canada. Pop. of S. (1891) 21,949; (1901) 21,440.

SUTH'ERLAND (George Granville William Sutherland Leveson-Gower), Duke of: born England, 1828, Dec. 19, died 1892, Oct. 6. He was educated at Eton College, sat in the house of commons for Sutherlandshire 1852–61, and succeeded his father, the second duke, 1861. He is one of the wealthiest of British peers; has estates in England and Scotland on which is a pop. of 24,000, and six great residences; is a stockholder in many English and Scotch financial corporations; and is a scientific agriculturist and a practical railroad engineer. In 1881, Apr., he came to the United States to study the railroad systems; subsequently made large investments in Neb. and Fla., and settled in the latter state; and 1889, Mar. 4, was married at Dunedin, Fla., to Mrs. Mary Blair.

SUTLEJ, *sŭt'lĕj*, or Sutluj, *sŭt'lŭj:* important river in n.w. India, eastmost of the five rivers of the Punjab; rising in the sacred lakes of Manasarovara and Rawan-Hrad in Thibet; lat. 30° 45′ n., long. 81′ 15° e. At its outfall from Lake Manasarovara, between 19,000 and 20,000 ft. above sea-level, it is a torrent 30 ft. broad. It flows n.w. 150 m., then, turning s.w., it receives the Spiti or Li, a larger stream than itself. The Spiti is 8,592 ft. above sea-level at its junction with the S., and the scenery is sublime in the highest degree. Continuing s.w., the S. breaks through the mountain rampart of the Himalaya, and after a total course of about 850 m., having been joined by the Beas and the Chenab, it falls into the Indus in lat. about 29° n. Its upper course is supposed to be identical with the Hesudrus, and its lower course (in which it is called the Ghara) with the Hyphasis of the ancients.

SUTLER, n. *sŭt'lĕr* [Dut. *zoetelen*, to do dirty work; *zoetelaar*, a scullion, a sutler: Ger. *sudeln*, to dabble in the wet, to do dirty work; *sudler*, a dabbler]: camp-follower; one who follows an army to sell provisions and liquors. Suttle, v. *sŭt'tl*, to act as a sutler. Sut'tling, imp. *-tlĭng:* Adj. engaged as a sutler: N. the occupation of a sutler. Suttled, pp. *sŭt'tld.*—A *Sutler* is a vender of provisions allowed by the quartermaster-gen. to follow an army in the field, for supplying the soldiers with such luxuries as they

can afford to purchase. Sutlers are under martial law, accompany the baggage on a march, and are narrowly watched, and severely punished if found guilty of any irregularities toward either the soldiers or inhabitants of the country. In the French army a soldier in each regt. is licensed to act as S., and is called *vivandier*. See CANTEEN.

SÛTRA, *sō'trâ* [from the Sanskrit *siv*, to sew—literally, therefore, a thread or string], in Sanskrit Literature: technical name of aphoristic rules, and of works consisting of such rules. The name is perhaps from the strings which fasten together the palm-leaves on which the words are written. The *groundworks* of the whole ritual, grammatical, metrical, and philosophical literature of India are written in such aphorisms; and, in the oldest works, brevity is carried to such an extreme that even the most experienced would find it difficult, sometimes impossible, to understand them without aid of commentaries, which are fortunately never lacking for a work in this style. Some of the more modern Sûtras seem to be imitations of the ancient aphoristic style, but lacking its brevity: the Sûtras of the Buddhists (see PITAKA) are conspicuous for prolixity as compared with the S. of Brahmanical literature.

SUTRO, *sō'trō*, ADOLPH HEINRICH JOSEPH: mining engineer: b. Aix-la-Chapelle, 1830, Apr. 29. He made a special study of mineralogy; came to New York 1850; and soon went to Cal., and engaged in mining with large success. In 1860 he went to Nev., and planned the famous tunnel, bearing his name, through the mountain containing the noted Comstock lode: the work was begun 1869 and completed 1879 (see TUNNEL). S. became very wealthy from the water tolls of his tunnel, and he used his means liberally in beautifying San Francisco, aiding Univ. of Cali. and other state and local institutions. He collected a grand scientific library of more than 200,000 volumes. He died 1898, Aug. 20.

SUTTEE, n. *sŭt-tē* [Skr. *sati*, a virtuous wife—from *sat*, good]: in *India*, the sacrifice of burning a widow on the funeral pile of her husband; the widow who so immolates herself. SUTTEE'ISM, n. *-ĭzm*, practice of self-immolation among Hindu widows.—*Suttee* was a hideous practice which till recent years prevailed in India, of a wife burning herself on the funeral pile, either with the body of her husband, or separately if he died at a distance.

The practice was current in India as early as B.C. 4th c.; and was strangely tolerated by the English rulers till 1829, since which time it has become extremely rare. It is based by the orthodox Hindus on the injunctions of their S'âstras, or sacred books; and various passages in their Purân'as (q.v.) and codes certainly *countenance* their belief of its meritoriousness. Thus the *Brahma-Purân'a* says: 'No other way is known for a virtuous woman after the death of her husband. . . . If her lord die in another country, let the faithful wife place his sandals on her breast, and, pure, enter the fire.' To the same purport, the code of *Vyâsa*. Also the code of *Angiras*: 'That

woman who, on the death of her husband, ascends the same burning pile with him, is exalted to heaven. . . . She shall dwell in a region of joy for so many years as there are hairs on the human body, or 35 millions. . . . The woman who follows her husband to the pile expiates the sins of three generations on the paternal and maternal side of that family to which she was given as a virgin. . . . No other effectual duty is known for virtuous women, at any time after the death of their lords, except casting themselves into the same fire. As long as a woman (in her successive transmigrations) shall decline burning herself like a faithful wife on the same fire with her deceased lord, so long shall she be not exempted from springing again to life in the body of some female animal.' For other quotations, see H. T. Colebrooke, *Digest of Hindu Law*, II., 451 ff. (Lond. 1801); and his 'Essay on the Duties of a Faithful Hindu Widow,' reprinted from *Asiatic Researches*, in his *Miscellaneous Essays*, I. (Lond. 1837). However, *Manu*, who, among legislators of ancient India, occupies the foremost rank, contains no words which enjoin, or even countenance, this practice. Moreover, no injunction of any religious work is admitted by the orthodox Hindus as authoritative unless it can show that it is taken from, or based on, the revealed books, the Vedas (see S'RUTI). An attempt of a Hindu writer has been made in late years to show that, in a certain text, there is a passage justifying S.; but Prof. H. H. Wilson showed that the text cited by the learned Râjâ is of doubtful canonicity; moreover, that a verse in the Rigveda commands the widow to return to her home; and that merely from a misreading of a single word of this verse, arose the interpretation which led to the disastrous injunction of S.: see H. H. Wilson, 'On the Supposed Vaidik Authority for the Burning of Hindu Widows, etc.,' reprinted from *Journal of the Royal Asiatic Society*, XVI., in his Works, II. (Lond. 1862).

SUTTER, *sôt'ér*, JOHN AUGUSTUS: 1803, Feb. 15, 1880, June 17; b. Kandern, Baden: pioneer. He received a milit. education; came to the United States 1834; engaged in trading with Indians and trappers in Santa Fé; crossed the Rocky Mountains to Or. 1838; sailed to the Sandwich Islands, bought a vessel, and took a cargo of merchandise to Sitka; and, while sailing down the coast, was stranded in the Bay of San Francisco, 1839, July 2. Seeking trade in the interior, he founded the first white settlement on the site of Sacramento; and, obtaining a grant of land from Mexico, built a fort and trading-post 1841, and became gov. of the n. district of Cal. In 1848, Feb., James W. Marshall (q.v.), while enlarging the race of S.'s saw-mill, discovered gold. The ensuing rush of miners destroyed S.'s property, and he was soon reduced to poverty. The U. S. supreme court decided against his claims to his land, the federal govt. would grant him no relief; and his later years were spent in Litiz, Penn., on a pension of $250 per month allowed him by the state of California.

SUTTLE, n. *sŭt'tl* [L. *subtīlĭs*, nice, accurate (see SUBTLE)]: the weight of goods after the tare has been deducted; net weight.

SUTTLE, v.: see under SUTLER.

SUTURE, n. *sū'tūr* [F. *suture*—from L. *sutūra*, a seam; *sutus*, pp. of *suĕrĕ*, to sew: It. *sutura*]: in *surg.*, the drawing together of a wound by sewing (see below): in *anat.*, seam or joint uniting the bones of the skull (see below): in *bot.*, the part where separate organs unite, or where the edges of a folded organ adhere. SU'TURAL, a. *-tū-răl*, of or relating to a suture; in *bot.*, applied to that form of dehiscence or separation of fruits which takes place at the sutures. SU'TURED, a. *-tūrd*, having sutures. VENTRAL SUTURE, in the *ovary*, that next the centre of the flower. DORSAL SUTURE, that which corresponds to the midrib.

SU'TURE: term in Anatomy and Surgery: also in Botany, denoting the union of separate organs or of adhesion of an organ folded on itself.—In *Anatomy*, S. designates the connection between the various bones of the cranium and face. A S. is *serrated* when formed by union of two edges of bone with projections and indentations (like the edge of a saw) fitting into one another: the coronal, sagittal, and lambdoidal sutures (see SKULL) are of this kind. A S. is *squamous* when formed by overlapping of the bevelled (or scale-like) edges of two contiguous bones. There are also the *harmonia* and the *schindylesis* sutures, the former being the simple apposition of rough bony surfaces, the latter the reception of one bone into a fissure of another.

In *Surgery*, S. designates various modes of sewing up wounds to hold the opposed surfaces in contact. The following are general rules for an emergency. In passing the needle, the edges of the wound should be held in contact with the forefinger and thumb of the left hand; and the

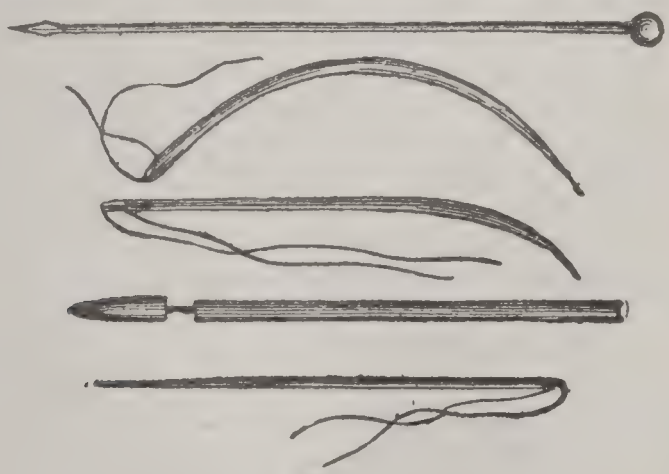


Fig. 1.

needle should penetrate the surface at about an angle of 50° (rather more than half a right angle), and should pass at least through the whole thickness of the skin at each stitch. The distance from the edge of the wound at which each stitch should enter and leave the skin must vary with the depth of the wound; but there should never be less than the eighth of an inch between the margin of the

wound and the entrance or exit of the needle. Sutures should not include vessels, nerves, muscles, or tendons. The line of the thread should cross that of the wound at right angles. For incised wounds on the surface of the body, when the edges can only be transfixed from the cutaneous surface, or when the opposite margins can both be traversed by one plunge, a curved needle (such as a common packing-needle) is most convenient; whereas a strong straight needle is more convenient for the completely free margins of extensive wounds, such as are left after amputation. Fig. 1 represents various forms of needles used by surgeons; fig. 2 shows the *twisted suture*, as used in the operation for hare-lip, in which the wound is transfixed by pins, around which, beginning with the uppermost, a thread is twisted, in the form of the figure 8.

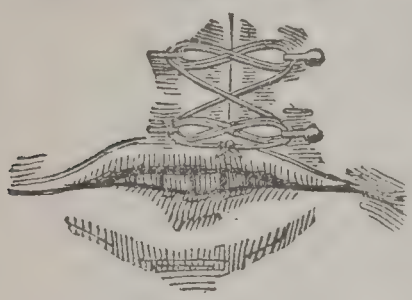


Fig. 2.

SUVO'ROF, ALEXANDER VASSILIEVICH: see SUWAROFF.

SUWAROFF, *sô-wâ'rof* (or SUVO'ROF), ALEXANDER VASSILIEVICH, Count—Prince Italiiski: Russian field-marshal, most famous of Russian generals: 1729, Nov. 24—1800, May 18; b. Moscow; descended from a Swede, Suvor, who emigrated to Russia 1622. His father, officer of the Russian army, who rose, in after-times, to the rank of gen. and senator, enrolled young S., at the age of 13, in the Semenof regiment, where he remained till 1754, when he was promoted lieut. In the Seven Years' War (q.v.), S., for conspicuous bravery and skill, especially at Kunersdorf, was made colonel. By a constant succession of eminent services in the Polish civil war (1768), in the war against the Turks (1773–4), in suppressing internal disturbances, and in subduing the Tartars of the Kuban (1783), he established his military reputation, and rose to the rank of general. In the Turkish war (1787–92) he was commander-in-chief, for the first time brought the bayonet prominently into use in the Russian army, and decided by it the bloody battle of Kinburn (1787), which would otherwise have been a total Russian rout. At the siege of Otchakof (1788), where he narrowly escaped being made prisoner, the battle of Fokshany (1789, Aug. 1), which he gained in conjunction with the Austrians, and the decisive victory of Rymnik (1789, Sep. 22), his headlong bravery and peculiar system of rapid and repeated attack by overwhelming numbers secured complete success. For this last victory, which saved the Austrians under Coburg from annihilation or capture, S. was created, by Emperor Joseph II., a count of the Austrian empire, and from his own sovereign received the title Count *Suwaroff-Rymnikski.* The great achievement which has given a predominant coloring to S.'s reputation in w. Europe was the capture by assault of Ismail (q.v.), 1790, Dec. His report to the empress was in the following terms: 'Glory to God and

Your Excellency! the town is taken; I am in it.' He was appointed (1791) gov. of the newly conquered provinces; was sent (1794) to complete the annihilation of the Polish monarchy, which he effected by repeated victories over the Polish armies, the capture of Praga by storm, and the *repossession* of Warsaw (Nov. 19), where a horrible massacre of the inhabitants took place. The grade of field-marshal and presents of rare value rewarded these successes. Under Paul, he fell into disgrace (1798), from his impatience of the emperor's fantastic military regulations, and was deprived of his rank. He retired to his country-seat, where he worked among the villagers in a smock-frock, tolled the bell on Sundays, and sang in the village choir. Being restored through English influence to his command, he led the Russian auxiliary army to co-operate with the Austrians against the French in Italy. 1799, Apr., he reached Verona; compelled Moreau to retire behind the Adda with immense loss, including more than 8,000 prisoners; entered Milan in triumph (Apr. 29); again defeated the French under Macdonald after a desperate three days' conflict at the Trebbia (June 17–19), and a third time at Novi (Aug. 15), depriving them of the whole of n. Italy. His campaign in Switzerland, which promised to bring him face to face with Massena, then the best general in Europe, was rendered abortive by the tardiness of the Austrians; and the Russians, in spite of S.'s remonstrances, were ordered home. His escape from the Schackenthal, where he was hemmed in by the French, is considered by many critics the most brilliant and daring retreat ever executed. About this time Emperor Paul changed his whole policy and turned to alliance with the French, recalling S. in disgrace, and refusing even to see him. The general retired to his country-seat, where not long afterward he died. His remains were honored with a magnificent funeral, and Czar Alexander erected a statue to his memory on the Champ-de-Mars. The simple inscription on his grave, according to his own direction, is—'Here lies Suwaroff.'—This extraordinary man had naturally a weak constitution, but strengthened it by exercise and strict temperance. His mode of life was of Spartan simplicity; and though the oddity of many of his habits seems ridiculous, yet it comported with a certain droll humor, and combined with his paternal care of his men to give him a powerful hold on the affections of an army at once so ignorant and so thoroughly national in sentiment as the Russian. S. was inflexible in his resolutions and promises, and of incorruptible fidelity. His strategic skill as a general has often been questioned, on the strength of his favorite remark that all military tactics could be expressed in three words, *stoupai i bi*, 'forward and strike;' but his career shows him to have had all needful military knowledge—though he hated idle maneuvering—and to have excelled in promptitude and ingenuity of conception, and boldness and rapidity of execution.

SUZERAIN, n. *sō'zĕ-rān* [F. *suzerain*, a lord paramount, a holder of a fief whence other fiefs depend—from *sus*, above—from L. *sursum*, above]: supreme or highest lord; but in feudal usage, a superior lord to whom fealty is due. According to the feudal system, as developed in n. Europe, every owner of Allodial (q.v.) lands was compelled to acknowledge himself the vassal of a suzerain, and do homage to him for his lands: the term S. was applied less to the king than to his vassals, who had sub-vassals holding of them. SU'ZERAINTY, n. *-rān-tĭ* [F. *suzeraineté*]: paramount authority or command.

SVENIGORODKA, *svā-nē-gō-rŏd'kâ:* town of Russia, govt. of Kiev, 150 m. s. from Kiev, on an affluent of the southern Bug. Pop. (1880) 11,375.

SWAB, n. *swŏb* [Dut. *zwabber*, a mop made of rope; *zwabberen*, to dabble, to paddle: Ger. *schwabbern*, to splash]: a mop made of unravelled rope, used on shipboard for cleaning the decks; a mop for cleaning floors; in *sailors' slang*, an awkward person; a lubber; an epaulet: V. to clean or dry with a mop. SWAB'BING, imp. SWABBED, pp. *swŏbd.* SWAB'BER, n. *-bĕr*, an inferior officer appointed to see the ship kept clean.

SWABIA, or SUABIA, *swā'bĭ-a*, or SUEVIA, *swē'vĭ-a* (Ger. *Schwaben*, *shwä'bĕn*): ancient duchy, in s.w. Germany; named from a horde of Suevi, who spread over it in the 5th c., and amalgamated with the Alemanni, its previous inhabitants. It existed as a great duchy of the Frank empire till the 8th c., when Alsace and Rhætia were separated from it, and the remainder, retaining its name of S., was thenceforth governed by *nuntii cameræ*, or royal delegates, one of whom, having in 915 usurped the title Duke of Alemannia, was condemned by the German diet, and decapitated 917. S. at this time was bounded w. and s. by the Rhine, e. by the Lech (which separated it from Bavaria) and Franconia, n. by the palatinate of the Rhine and Franconia; about 13,000 sq. m. In 918 S. was acknowledged as a ducal fief of the empire; and, after changing hands several times, was (1080) bestowed on Count Frederick of Hohenstaufen (q.v.), founder of the illustrious house of that name, known also as the House of S. Under the rule of this prince and his successors, S. became the most rich, civilized, and powerful country of Germany, and the ducal court was the resort of the Minnesingers (q.v.); but the wars of the Guelphs and Ghibellines, and the quarrel with the French respecting Naples, put an end to the dynasty 1268. The ducal vassals in S. rendered themselves almost independent, and professed to acknowledge no lord but the emperor. During these dissensions arose the lordships of Würtemberg and Baden, with numerous lesser states, holding direct of the crown; and opposed to them the cities, which strove for an equal independence, and at last, in reward of important service, obtained 1347 great additional privileges. A number of them united 1376 to make common cause against the neighboring feudal lords (known as the *First*

Swabian League); an opposite league was formed 1405 between Würtemberg, Baden, and 17 towns, called the League of Marbach; and both took part in the war of Swiss independence—the former in support of the Swiss, the latter of the Austrians. At last the towns, which had been rapidly increasing in wealth and power, decided at Ulm, 1449, to form a standing army and a permanent military commission, for forcible preservation, if necessary, of peace and order; and the Count of Würtemberg, the most powerful of the opposite party, having joined them, was appointed military chief of the league, which ultimately grew up into the *Great Swabian League*, and exercised both administrative and judicial authority over the whole country, effectively repressing feudal quarrels. In 1512 S. became one of the ten circles into which Germany was divided, received its complete organization 1563, and retained it almost without change till the dissolution of the empire 1806. But during this period, the wars of the towns with Würtemberg, the Peasants' War, of which S. was one of the foci, the Thirty Years' War, and those between France and the empire, destroyed the democratic constitution of the towns; and with it their energy, and then their prosperity, disappeared, leaving few relics of their former great political importance.

The name S. is now confined officially to a little province in Bavaria (cap. Augsburg), though popularly it is still applied to the extensive districts comprised in the old duchy.

SWABIAN, a. *swā'bĭ-an:* in *geog.*, of or belonging to Swabia. SWA'BIAN LEAGUE, n. league formed against the barons by the cities of Swabia and of the Rhine, 1370. A larger league of this name was formed 1488, under the auspices of Emperor Frederick III., to put down private wars and maintain the public peace. It destroyed more than one hundred and forty castles of nobles and robbers. It was dissolved 1533.

SWAD, n. *swŏd* [connected with *squash* and *squab*]: in *OE.*, a peascod; a handful of pea-straw; a fat short person; a lout; a rustic.

SWADDLE, v. *swŏd'dl* [from SWATHE, which see]: to bind, as with a bandage; to swathe; in *OE.*, to cudgel; to beat: N. clothes bound round the body. SWAD'DLING, imp. *-dlĭng.* SWADDLED, pp. *swŏd'dld.* SWAD'DLING-BAND, a band or cloth wrapped round an infant. SWADDLING-CLOTHES, the clothes in which an infant is wrapped or dressed. SWADDLING-CLOUTS, OE. for swaddling-clothes.

SWAG, v. *swăg* [Norw. *svaga*, to sway: Ger. *schwanken*, to stagger, totter, falter: Sw. *svag*, weak, bending: Swiss, *schwabben*, to splash, to stagger like a drunken man; *schwägeln*, to stroll about: Bav. *schwadern*, to splash, to bluster]: to sink down by its own weight; to move, as something heavy and pendent; to sway. SWAG'GING, imp.: ADJ. swaying heavily. SWAGGED, pp. *swăgd.* SWAGGER, v. *swăg'gĕr*, to bluster; to bully; to brag noisily; to walk in

an affected manner, swaying from one side to the other: N. an affected or insolent manner of walking. SWAG'GERING, imp.: ADJ. blustering; exhibiting an insolent or affected manner. SWAG'GERED, pp. *-gĕrd.* SWAG'GERER, n. *-gĕr-ĕr*, one who swaggers; a boastful noisy fellow. SWAG'GY, a. *-gĭ*, dependent by its weight; swaying. SWAG-BELLIED, *-bĕl'lĭd*, having a large belly.

SWAG, n. *swăg* [see SWAG 1]: in *slang*, plunder; booty; money.

SWAGE, v. *swāj* [corrupted from *assuage*]: in *OE.*, to ease; to mitigate; to appease; to quiet.

SWAGE, a. *swāj* [etym. doubt.]: a tool having a face of a given shape, the counterpart of which is imparted to the object against which it is forcibly impressed: V. to shape by means of a swage; to fashion by hammering in a groove or mold of the required shape.

SWAGGER: see under SWAG 1.

SWAHILI, *swä-hē'lē* [*wa*, people, and Ar. *sáhil*, coast]: inhabitants of the island of Zanzibar and the opposite mainland on the e. coast of Africa, 2°—9° s. lat. They are under the govt. of the sultan of Zanzibar; and, like their language, are a mixture of native Bantu with Arab, three to one—the latter element giving the S. force and intelligence, which have made them traders at large, and their language the only general medium of communication in Africa s. of the equator. The language, however, has several dialects: the Ki-Ngozi, the least Arabic, n. of the Tana river; the Ki-Mvita of the Mombasa dist.; and the Maneno Unguya of Zanzibar, with the most foreign admixture. Of the last, grammars have been published, and parts of the Bible have been translated into it by Bp. Steere. Missionary effort among this people has not been very encouraging.—The name S. is given also to the coast, which is low, warm, and luxuriant in vegetation, with moist winds from the Indian Ocean; and abounds with mangroves, tall reeds and grasses, the copal-tree, etc.: it is well adapted to cultivation of the grains, fruits, and spices of warm climates.

SWAIN, n. *swān* [Dan. *svend*, a bachelor: Icel. *sveinn*, a boy, a young man]: a young man employed in husbandry; a rustic; a lover. SWAIN'ISH, a. *-ĭsh*, rustic; churlish. —SYN. of 'swain': peasant; clown; countryman; hind; clod-pole.

SWALE, a. *swāl* [Icel. *svala*, to cool, to refresh; *svali*, coolness]: in *prov. Eng.*, bleak; windy; cold: N. a valley or low place; shade, in opposition to sunshine See YORKSHIRE.

SWALLOW, n. *swŏl lō* [Icel. *svala;* Dan. *svale;* Ger. *schwalbe;* Dut. *zwaluw*, a swallow]: well-known migratory bird (see below). SWALLOW-TAIL, n. a kind of willow; a swallow-tailed coat. SWALLOW-TAILED, a. narrowing toward the end; forked.

SWALLOW, v. *swŏl'lō* [Ger. *schwelgen*, to guzzle: Dan. *svælge;* Icel. *svelgia*, to swallow: Dut. *zwelgen*, to devour]: to take down the throat; to absorb; to draw or sink into; to engross; to occupy completely; to exhaust; to consume; to employ; to receive or embrace without scruple or examination, as opinions; to bear patiently, as to *swallow* an insult. SWAL'LOWING, imp.: N. act of taking into and down the throat (see SWALLOWING, ACT OF): act of absorbing; receiving implicitly, as a story, etc. SWAL'LOWED, pp. *-lōd.* SWAL'LOWER. n. *-ér*, one who swallows. SWALLOW-HOLES, certain holes or fissures in the mountain limestone of Derbyshire, etc., which frequently receive or swallow up streams that reappear in the low country.—SYN. of 'swallow': to absorb; imbibe; engulf; overwhelm; appropriate; consume.

SWAL'LOW (*Hirundo*): Linnæan genus of birds, of order *Insessores*, tribe *Fissirostres*, now divided into a number of genera, which form the family *Hirundinidæ*. This family consists of birds which prey on insects, catching them in the air, and have great powers of flight, soaring to a great height, or skimming near the surface of the ground or of the water, and wheeling with great rapidity. The bill is short and weak, very broad at the base, so that the gape is wide; the wings are very long, pointed, and more or less sickle-shaped when expanded; the legs are short and weak. The tail is generally forked. The plumage is close and glossy. The species are very numerous, and diffused through almost all countries. Those in colder regions are summer birds of passage, migrating to warmer climates when winter approaches and insects disappear. The European Chimney S. (*Hirundo rustica*) exhibits a character common to many other species, in the very long and deeply-forked tail, the two lateral feathers of which far exceed the others in length. The plumage is very beautiful, the upper parts and a band across the breast glossy bluish black, the forehead and throat chestnut, the lower parts white, and a patch of white on the inner web of each of the tail-feathers except the two middle ones. The whole length of the bird is about 8½ inches, of which the outer tail-feathers make 5 inches. The nest, like that of the American Chimney S., is of mud or clay, formed into little pellets and stuck together, also with straw and bents, and lined with feathers. It is open and cup-shaped, and is generally placed where it is sheltered from wind and rain, e.g., a few feet down an unused chimney, under the roof of an open shed, or in any unoccupied building to which access can be obtained. Two broods are produced in a year. The geographical range of this species extends over great part of Europe, Asia and Africa.—The Window S., or House-martin (*H. urbica*, or *Chelidon urbica*), is another very common Brit. species, glossy black above, white below, and on the rump; feet covered with short downy white feathers, which is not the case in the Chimney S.; tail long, but its outer feathers not remarkably so. The nest is of mud or clay, but is hemispherical, with entrance on the side, and is attached

to a rock, or, very frequently, to the wall of a house, under the eaves or in the upper angle of a window, to the annoyance of housekeepers who prefer the cleanness of their windows to the lively twitter of the birds, and the opportunity of watching their process of nest-building and their care of their young. House-martins congregate in great numbers, as chimney swallows also do before their autumnal migration, and disappear all at once. The house-martin is among the birds of Lapland and Iceland. The only other common Brit. species of S. is the Sand-martin (*H. riparia*), native also to N. America, smaller than either of the preceding, toes naked, tail moderately forked, plumage gray on the upper parts and across the breast, under parts white, and a feathery tuft on the tarsus. It makes its nest in sandy river-banks, the sides of sand-pits, etc., excavating a gallery 18 inches or 2 ft., sometimes 3 or even 5 ft. in length, and more or less tortuous, at whose extremity some soft material is placed for reception of the eggs. This wonderful excavation is accomplished entirely by the bill of the bird. The floor slopes a little upward from the entrance, so that lodgment of rain is prevented. The sand-martin is more local than the other Brit. swallows; but it is distributed over most parts of Europe, Asia, Africa, and N. America.—The other N. American swallows are the Barn S.(*H. horreorum*), lustrous steel-blue above, reddish below, face and throat deep chestnut, and outer tail feathers very long and attenuate; the White-bellied S. (*Tachycineta bicolor*), lustrous green, white below, tail emarginate, the nest in hollow trees, or usurping martin-boxes; the Violet-green S. of the Rocky Mts. and Pacific Slope (*S. Thalassina*), green above, with purple tail coverts, white below—breeding in any cavities; the Cliff S. (*Petrochelidon lunifrons*), above and spot on the throat steel-blue, breast rusty gray, the nest bottle-shaped, on cliffs or under eaves of buildings; the Rough-winged S. (*Stelgidopteryx serripennis*), brownish gray, below paler, the male wing bordered with hooklets; and the Purple Martin (*Progne purpurea*), which is not purple, but blue-black, the female and young streaked below—a species made welcome to boxes or other conveniences for its nests, and regarded as a protector of poultry from hawks (which it pursues), and at the same time as not a dangerous foe of domestic bees, though it lives on similar insects and beetles.—The so-called Chimney S. is a Swift (q.v.). All the above Amer. species are exclusively such, except the Bank S., which is singular as a land bird of both hemispheres. The Fairy Martin (*H. Ariel*), small Australian species, also builds a flask-shaped nest, with the mouth below, attaching it to a rock, or to the wall of a house, and numerous nests are often built close together.—Some of the swallows of tropical countries are much smaller than any European species.—The E. Indian swallows, which make the edible nests (see NESTS, EDIBLE), belong to another family to which the name Swift (q.v.) is given.

SWAL'LOWING, Act of: accomplished by a set of associated movements which have been divided by physiologists into three stages. In the first stage, the food having been duly reduced to a pulp by trituration and insalivation, is carried back by the contraction of various muscles until it has passed the anterior palatine arch: see Palate. Thus far, the movements are purely voluntary. The second stage now begins, during which the entrance of food into the nasal cavities and larynx is most carefully guarded against by certain reflex (involuntary) actions, clearly recognized only since the comparatively recent introduction of the use of the laryngoscope. The tongue is carried further backward, the larynx rises so as to be covered by the epiglottis, which is depressed, and lies horizontally, so that its upper border touches the posterior wall of the pharynx. Coincident with these movements, the sides of the posterior palatine arch contract by muscular action, and approach each other like a pair of curtains, so as almost to close the passages from the fauces into the posterior nostrils; the closure being completed by the uvula. A sort of inclined plane is thus formed, and the morsel slips downward and backward into the pharynx, which is raised to receive it. Very little, if any, voluntary action is here exerted. The third stage —the propulsion of the food down the œsophagus—then begins; and this is effected in the upper part by the constrictor muscles of the pharynx, and in the lower by the muscular coat of the œsophagus itself. At the point where the latter enters the stomach, there is a sort of sphincter muscle, usually closed, but which opens when sufficient pressure is made on it by accumulated food, closing again when this has passed. See Carpenter's *Principles of Human Physiology.*

SWAL'LOW-WORT: see Asclepias.

SWAM, v. *swăm*: pt. of Swim, which see.

SWAMMERDAM, *swăm'mĕr-dăm*, Jan: naturalist: 1637, Feb. 12—1680, Feb. 17; b. Amsterdam. He studied medicine, particularly anatomy; and unremittingly collected insects, investigating their metamorphoses and habits, and, by aid of the microscope, examining their anatomy. He took his degree Doctor of Physic at Leyden 1667; but he gave his time so much to entomology that his professional practice suffered. His father sought to correct this by withdrawing all supplies; but with the result only that S. experienced privations which were the source of bodily and mental disease. His many publications, all first in Dutch, were translated into Latin, and many into English, French, and German: his *General History of Insects* is at the foundation of modern entomology. S.'s discoveries were very numerous, in human and comparative anatomy. His skill with the microscope was very great. He was the inventor of the method of making anatomical preparations by injecting the blood-vessels with wax, also of the method of making dry preparations of the hollow organs, now generally employed.—S., in his enfeebled health, fell under the influence of the fanatical extravagances of Antoinette

Bourignon (q.v.), and relinquished all his scientific pursuits for a visionary life of meditation and devotion; and not long afterward he died at Amsterdam.

SWAMP, n. *swŏmp* [Dan. and Sw. *svamp*, a sponge, fungus: Sw. *svampig*, spongy: Low Ger. *swamp;* Ger. *schwamm*, a sponge, a soft spongy growth: Goth. *swumsl*, a swamp]: a tract of land saturated with moisture, and unfit for agricultural or pastoral purposes, but having a growth of certain kinds of trees—commonly, though erroneously, used as synonymous with bog or morass: V. to plunge or sink in, as in a swamp; to overwhelm and fill with water, as a boat; to plunge into inextricable difficulties. SWAMP'ING, imp. SWAMPED, pp. *swŏmpt*. SWAMPY, a. *swŏmp'ĭ*, consisting of or like a swamp; wet and spongy. SWAMP-ORE, a familiar term for bog-iron ore, which occurs in swampy tracts in bands or cakes of considerable thickness.—SYN. of 'swamp, n.': fen; bog; marsh; morass.

SWAN, n. *swŏn* [Dut. *zwaan;* Dan. *svane;* Ger. *schwan;* Icel. *svanr*, a swan]: web-footed aquatic bird resembling the goose, with very long neck, and remarkable for grace and elegance while swimming (see below). SWAN-UPPING, or SWAN-HOPPING, the custom of catching the tame swans once a year in order to mark them. SWAN'NERY, n. *-nĕr-ĭ*, a breeding-place for swans. SWAN-LIKE, after the manner of a swan. SWAN'S-DOWN, the down of the swan; a fine, soft woolen cloth. SWAN-SHOT, a large kind of shot. SWANSKIN, the skin of a swan with the feathers; a kind of fine flannel; a blanket used in printing.

SWAN (*Cygnus*): genus of birds constituting a very distinct section of the Duck (q.v.) family (*Anatidæ*). They have a bill about as long as the head, of equal breadth throughout, higher than wide at the base, with a soft cere, nostrils placed about the middle; neck very long, arched, and with 23 vertebræ; front toes fully webbed, hind toe without membrane; keel of the breastbone very large; intestines very long, and with very long cæca. They feed chiefly on vegetable substances, as the seeds and roots of aquatic plants, but also on fish-spawn, of which they are great destroyers. They are the largest of the *Anatidæ*. They have a hissing note like geese, which they emit when offended, and they strike with their wings in attack or defense. The common notion, that a stroke of a swan's wing is sufficient to break a man's leg, is exaggerated. The COMMON S., MUTE S., or TAME S. (*C. olor* or *C. gibbus*), is about 5 ft in entire length, and weighs about 30 lbs. It is known to live at least 50 years. The male is larger than the female. The adults of both sexes are pure white, with reddish bill; the young (cygnets) have a dark bluish-gray plumage, and lead-colored bill. The bill is surmounted by a black knob at the base of the upper mandible, and has a black nail at its tip. In its wild state, this species is found in e. Europe and in Asia; in a half-domesticated state it has long been a common ornament of ponds, lakes, and rivers in all parts of Europe, and in some places in this country. It is an extremely beautiful bird, when seen swimming,

with wings partially elevated, as if to catch the wind, and finely curving neck. The ancients called the S. the Bird of Apollo or of Orpheus; and ascribed to it remarkable musical powers, which it was supposed to exercise particularly when its death approached. It has, in reality, a soft low voice, plaintive and with little variety, heard chiefly when it is moving about with its young. The nest of the S. is a large mass of reeds and rushes, near the edge of the water, an islet being generally preferred. From 5 to 7 large eggs are laid, of dull greenish-white color. The female S. sometimes swims about with the unfledged young on her back; and the young continue with their parents till the next spring. The S. is now seldom used as food, but in former times it was served up at every great feast, and old books are very particular in directions for its cookery. There is no reason why its rearing for the table should not become extensive.—The POLISH S. (*C. immutabilis*), differs from the Common S. in its orange-colored bill, in the smaller tubercle at its base, and in the shape and position of the nostrils: the young also are white, like the adults. It belongs chiefly to n.e. Europe. Many naturalists regard it as the true wild state of the Common Swan.—The WHISTLING S., ELK S., or HOOPER (*C. ferus*, or *Olor musicus*) abounds in n. Europe and Asia. Its migrations extend as far s. as Barbary. A few breed in the Orkney Islands, but the greater number in more northern regions. The size is about equal to that of the Common S., and the color is similar, but the bill is more slender, is destitute of knob, and is black at the tip, and yellow at the base. This bird is frequently brought to the London market. Its names Hooper and Whistling S. are derived from its voice. The anatomical differences between this species and the Common S. are more considerable than the external, particularly in the double keel of the breastbone forming a cavity which receives a long curvature of the windpipe; and to swans with this anatomical feature the generic name *Olor* should be given; to others, having also a knob on the base of the bill, the name *Cygnus*. BEWICK'S S. (*C. Bewickii*), another native of n. Europe, is about one-third smaller than the Whistling Swan.—The AMERICAN S. (*C.* or *O. Americanus*) nearly resembles Bewick's Swan. It breeds in n. parts of N. America and its winter migrations extend only to N. C.: it has a lateral yellow spot on the bill. The TRUMPETER S. (*C. buccinator*) is another Amer. species, breeding chiefly within the Arctic circle, but of which large flocks are seen in winter as far s. as Texas: it is larger than the preceding, and has a black bill. A large crest of horny substance is developed midway on the bill in the breeding season, in some if not all of the species.—The ancients spoke of a black S. proverbially as a thing of which the existence was not to be supposed; but Australia produces, abundantly in some parts formerly, a BLACK S. (*C. atratus*), rather smaller than the Common S., the plumage black, except the primaries of the wings, which are white: the bill is blood-red. It has been introduced into Britain, and breeds freely. The BLACK-NECKED S. (*C. ni-*

gricollis) is a S. Amer. species, as is the DUCK-BILLED S. (*C. anatoides*), smallest of all the species, white, with black-tipped primaries, common about the Strait of Magellan. It is notable that the black color appears more or less in all the species of the s. hemisphere, and in them alone, except in the approach to it made in cygnets.

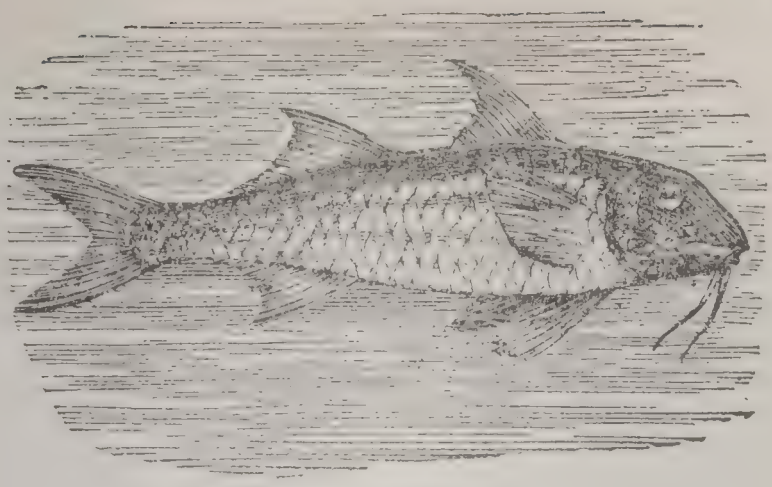
Swans, according to the law of England, are birds-royal: when partially wild, on the sea and navigable rivers, they are presumed to belong to the crown. The royal birds generally have a mark on them, and the king's swan-herd anciently was an important person. Any person may have tame swans in his grounds, and then he has a property in them.

SWAN, *swân*, JAMES: 1754–1831, Mar. 18; b. Fifeshire, Scotland: revolutionary milit. officer. He emigrated to Boston at an early age; joined the patriots, took part in the 'tea party,' and was an aide to Gen. Warren at Bunker Hill, was a capt. in Craft's regt. of artil., and accompanied the expedition that drove the British fleet out of Boston Harbor; and afterward was sec. to the Mass. board of war, member of legislature, and adjt.gen. of the state. In 1787–95 he lived in France, and became wealthy; 1795–98 lived in the United States and spent money freely; 1798–1815 was engaged in large commercial operations in Europe; and 1815–30 was in a Paris prison on the suit of a German business man. He published, among other works, one against the slave-trade (Boston 1772); *On the Fisheries* (Boston 1784); and *Address on Agriculture, Manufactures, and Commerce* (1817).

SWAN RIVER: river of Western Australia (q.v.).

SWANN, THOMAS: 1805–1883, July 24; b. near Leesburg, Va.: legislator. He received a univ. education; studied law; was sec. to the Neapolitan commission; became director of the Baltimore and Ohio railroad 1836, pres. 1847; was also pres. of the Northwestern Virginia railroad; and was elected mayor of Baltimore 1856 and 58. He freed all his slaves before the civil war, and was a stalwart upholder of the Union; was elected gov. of Md. 1864, and U. S. senator 1866, but declined the latter, and served as gov. till 1869; and was a member of congress 1869–79.

SWANSEA, *swŏn'zē* or *-sē* (Welsh, *Abertawy*): market-town, municipal and parliamentary borough, and seaport of the county of Glamorgan, S. Wales; on the right bank and near the mouth of the Tawe; 60 m. w.n.w. of Bristol, 45 m. w.n.w. of Cardiff. The harbor is formed by piers of masonry, projecting from either side of the mouth of the Tawe into the beautiful Swansea Bay, a wide inlet of the Bristol Channel. The vast resources of the coal-field in the midst of which the town is situated, began to be explored and turned to commercial account about 1830; and the progress of S. has since been so rapid that it is now the most important town in S. Wales. The houses and public edifices and institutions are of recent erection. There is a good public hall, and a spacious and well-arranged infirm-



Surmullet (*Mullus surmuletus*).

Swallows.

Wild **Swan**, or Hooper (*Cygnus ferus*), and Black **Swan** (*C. atratus*).

ary. Smelting and refining copper is the staple trade of the town, and the chief source of its prosperity. The coal obtained in the vicinity is peculiarly adapted for smelting purposes; and great quantities of ore are brought hither to be smelted, not only from the copper mines of Britain, but from Cuba and the w. coast of S. America. In the immediate vicinity of the town there are smelting-works, in which about 185,800 tons of copper, copper ores, silver ores, and zinc ores (equal in value to about £4,000,000) are smelted annually. Of the whole amount of copper manufactured in Great Britain, seven-eighths are smelted at S. and in its immediate vicinity. There is a large floating dock of 13 acres, lined on its n. side with warehouses. In 1881 a new dock was finished at a cost of £300,000. S. has an excellent system of water-works. Patent fuel, a mixture of culm and tar, compressed into the shape of bricks, is an important article of manufacture and trade. There are extensive potteries, and tin, silver, and china works, breweries, rope-walks, and tanneries. In 1880 there entered the port 2,345 vessels of 523,381 tons; cleared 2,973 of 696,679 tons. There are abundant means of communication landward by canals and railways. Pop. (1871) 51,702; (1881) 63,739; (1901) 94,514. Of the old castle of S. the ruined remains are used as a military store.

SWAP, v. *swŏp* [imitative of the sound of a blow, hence any sudden movement, as in falling: Low Ger. *swaps*, expressing the sound of a smack, quick: W. *chwap*, a sudden blow, instantly: Ger. *schwappen*, to swap]: in *OE.* and *prov. Eng.*, to strike with a hasty sweeping blow; to fall down with sudden violence; *familiarly* (from the notion of a sudden turn), to exchange; to barter: N. a barter; an exchange; in *OE.*, a blow; a stroke: AD. hastily; at a blow SWAP'PING, imp.: ADJ. in *OE.*, plying the wings with noise; striking the air. SWAPPED, pp. *swŏpt*. See SWOP.

SWAPE, n. *swāp* [a form of SWEEP]: a long pole turning on an upright post, used for raising water from a well; a long oar.

SWARD, n. *swawrd* [Icel. *svördr;* Dut. *zwoord;* Ger. *schwarte*, the thick skin of bacon or pork]: the coat of turf on a grass field, hillside, etc.; in *OE.*, the skin of bacon. SWARDY, a. *swawrd'ĭ*, covered with grass.

SWARE, v. *swär:* the old pt. of the verb SWEAR, which see.

SWARGA, *swăr'gă*, Hind. *swêr'ga:* paradise of the Hindu god Indra (q.v.); the residence of some of the inferior gods and deified mortals, who there rest amid many delights in the shade of the five wonderful trees.

SWARM, n. *swawrm* [Ger. *schwärmen*, to make a confused sound, as a multitude in motion: Dut. *zwerm;* Sw. *svärm;* Ger. *schwarm;* Dan. *sværm*, a swarm]: multitude of small animals or insects in motion; especially, a large number of bees seeking a new home, or when collected in a hive; a multitude of people; a great number; a cluster; a crowd: V. to crowd together with confused movements; to

collect and depart from a hive in a body, as honey-bees seeking new quarters; to throng together; to be thronged or overrun. SWARM'ING, imp.: ADJ. collecting and moving in a crowded body as bees do; thronging. SWARMED, pp. *swawrmd.*—SYN. of 'swarm, n.': throng; mob; multitude; populace.

SWARM, v. *swawrm* [O. Fris. *swerva*, to crawl: Dut. *swermen*, to wander about: perhaps connected with *squirm*]: to climb the bole of a tree by the alternate twisting of the arms and legs around it; to wriggle about.

SWARM'ING, in Botany: peculiar mode of reproduction observed in some *Confervaceæ*, *Desmideæ*, etc. The granules which form the green matter in the plant, or in one of its joints, become detached from each other, and move about in the cell with great rapidity. The external membrane swells in one point, and finally bursts there, when the granules escape into the surrounding water to become new plants. At first, they issue in great numbers, but those which remain last move about within their cell for a long time before they find the way out. Their motion is supposed to be due to cilia. After escaping, they continue their movements for some time, and most of them finally become grouped together in little masses on some substance before beginning to vegetate.

SWART, a. *swawrt*, or SWARTH, a. *swawrth* [Goth. *svarts;* Icel. *svartr;* Dan. *sort;* Ger. *schwarz*, black]: darkly brown; somewhat black; tawny. SWART, v. to blacken; to make dusky. SWART'ING, imp. SWART'ED, pp. SWARTH, n. *swawrth*, in *OE.* and *prov. Eng.*, apparition of a person about to die. SWARTHY, a. *swawrth'ĭ*, being of a dark or dusky complexion; tawny. SWARTH'ILY, ad. *-lĭ*. SWARTH'INESS, or SWART'INESS, or SWART'NESS, n. duskiness or darkness of complexion.

SWARTH, n. *swawrth:* OE. for SWATH; also for SWARD, turf.

SWARVE, v.: OE. and Scot. for SWERVE.

SWASH, n. *swŏsh* [prov. Sw. *svasska*, to make a 'swashing' noise: Sw. *svassa*, to swagger: Norw. *svaga*, to sway (see also SWAG 1)]: the noise made by a liquid flowing with violence; blustering; a swaggerer; in *arch.*, a figure whose circumference is not round but oval; wash: V. in *OE.*, to bluster; to splash; to make a clatter or great noise. SWASH'ING, imp.: ADJ. having the character of a bully; crushing. SWASHED, pp. *swŏsht.* SWASH'ER, n. in *OE.*, one who makes a show of valor or force of arms. SWASH'BUCK'LERS, n. *-bŭk'lĕrz*, in *OE.*, swaggering boastful fellows—said to be so named from the clanking noise made with their swords and bucklers or shields. SWASHY, a. *swŏsh'ĭ*, soft and moist, like fruit too ripe.

SWATCH, n *swŏch* [see SWATH]: in *Scot.*, a pattern, as of cloth; in *OE.*, a swath.

SWATH, n. *swawth* [Ger. *schwad;* Dut. *zwade;* Low Ger. *swad,* the line of grass left by the mower: prov. Eng. *swaff,* as much grass as the scythe cuts at one stroke]: the line or row of grass as it lies on the left of the mower, cut by his scythe; the whole breadth or sweep of the scythe or mowing-machine; a bandage or fillet.

SWATHE, v. *swāth* [from SWATH, which see]: to make a bundle of; to tie up in bundles; to bandage; to wrap: N. a bandage or fillet. SWATH ING, imp. SWATHED, pp. *swāthd.* SWATHING-CLOTHES, swaddling-clothes.

SWATOW, *swā-tow'*, or CHAU-CHOU: seaport town on a sheltered bay on the coast of China, province of Quang-tung, 212 m. e.n.e. from Canton. It is one of the ports opened to foreign trade by the treaty of Tien-tsin, and has a resident British consul. The trade is increasing: half of the total is direct trade with foreign ports Opium is the chief import, next are cotton and woolen goods, metals, and cotton yarn. The chief exports are sugar, rice, tea, and paper. Pop. (1901) 38,000.

SWAY, v. *swā* [Dut. *zwaaijen,* to swing, to brandish: Icel. *sveigja,* to bend: Norw. *sviga,* to bend or give way: Dan. *svaie,* to swing to and fro]: to move backward and forward freely in the hand; to wave or swing; to influence or direct by power or force; to bias; to hang in a heavy unsteady manner; to lean to one side; to have influence; to bear rule; to govern: N. the swing or sweep of a weapon; the motion of a thing moving heavily; influence; power exerted in governing; any weight or authority which inclines to one side. SWAY'ING, imp. SWAYED, pp. *swād.* —SYN. of 'sway, v.': to bias; rule; overpower; influence; —of 'sway, n.': power; rule; empire; dominion; weight; preponderance; direction; control; ascendency.

SWAYNE, *swān,* JOHN WAGER: soldier and lawyer: b. Columbus, O., 1834, Nov. 10. He graduated at Yale 1856, and at the Cincinnati Law School 1859. After two years' practice of law in Columbus, O., he entered the war as maj. of vols., became lieut.col. 1861, col. 1862, brig.gen. 1865, and maj.gen. the same year. In 1866 he was appointed col. in the regular army, and brevetted brig.gen. 1867, and maj.gen., and mustered out the same year. His record is one of efficiency and courage. After the war he was commissioner of the freedmen's dept., organizing schools and Talladega Coll. in Ala., and charged with reconstruction duty. He practiced law in Toledo, O., and afterward in N. Y., associated with Judge Dillon as counsel for the Jay Gould properties. He d. 1902, Dec. 18.—His father, NOAH HAYNES S., 1804-1884, June 8, justice of the supreme court of the United States 1862-81, was born and educated in Va.; he emancipated slaves acquired by marriage, practiced law in O., was counsel for fugitive slaves, and was member of legislature, dist. atty., U. S. boundary commissioner, etc.

SWEABORG, or SVEABORG, *svā'â-borg:* great Russian fortress in Finland, sometimes called 'the Gibraltar of the North,' protecting the harbor and town of Helsingfors, 2 m. distant. The fortifications extend over seven islands, the *Nylandischen Skären;* but the grand central point is the island Wargöe. The islands are connected by bridges, and between two of them lies the single narrow entrance to the harbor, which can hold 70 or 80 ships of the line. The greater part of the inhabitants are manual laborers, ship-carpenters, and traders: its garrison numbers about 5,000 (including women and children). During the Crimean war, the Anglo-French fleet in the Baltic made a reconnaissance of the place, and bombarded it for two days, 1855, Aug. 9, 10; but found the defenses too formidable to be reduced by the means at their disposal.—Civic pop. about 3,000.

SWEAL, v. *swēl* [Icel. *svæla,* thick smoke: Ger. *schwelen,* to burn slowly (see also SULTRY)]: to melt wastefully away, as candles; to singe, as a hog. SWEAL'ING, imp. SWEALED, pp. *swēld.*

SWEAR, v. *swär* [Icel. *sverja;* Dan. *sværge;* Ger. *schwören,* to affirm with an oath: Icel. *svara,* to answer: Goth. *svaran,* to swear: OHG. *wâr;* Ger. *wahr,* certain, assured: Low Ger. *waren,* to prove by witnesses or documents]: to affirm on oath; to appeal solemnly to God for the truth of what is stated; to administer an oath to; to declare a promise upon oath; to give evidence upon oath; to use profane language, or use the name of God irreverently; to obtest by an oath; to vow; in *OE.,* simply, to aver; to affirm. SWEAR'ING, imp.: ADJ. affirming upon oath; causing to swear: N. the act of affirming on oath; profane or irreverent language (see SWEARING, PROFANE). SWORE, pt. *swōr,* or SWARE, in *OE.,* pt. *swär,* did swear. SWORN, pp. *swōrn,* affirmed on oath. SWEAR'ER, n. *-ér,* one who swears; one who habitually uses profane or irreverent language.

SWEAR'ING, PROFANE: trifling or colloquial use of oaths, adjurations, imprecations, etc. In several states of the Amer. Union, it is variously declared punishable by the statutes, though prosecutions for the offense are very rare.—See BLASPHEMY: RELIGION, OFFENSES AGAINST.

SWEAT, n. *swèt* [Icel. *sveiti;* Dut. *zweet;* Dan. *sved;* AS. *swát,* sweat: Skr. *svaidas,* sweat: L. *sūdor,* sweat]: the moisture which appears on the skin of animals in hot weather, or during severe exertion or labor (see below): also generally, moisture exuding from any substance, e.g., *sweat* from hay: toil; labor; drudgery: V. to give forth moisture through the pores of the skin; to cause to perspire; to shed; to exude; to toil; to drudge; in *slang,* to fleece or bleed, as a sharper his victim. SWEAT'ING, imp.: ADJ. giving forth moisture from the skin: N. the act of making to sweat; a kind of fermentation in the manufacture of tobacco-leaf; a process of fraudulently lessening the weight of gold coins by shaking them in a bag; the employment of working tailors in their own homes at low wages. SWEAT.

or SWEATED, pt. and pp. *swĕt* or *swĕt'ĕd*. SWEAT'ER, n. *-ĕr*, one who or that which causes to sweat; a middleman between slop-sellers and working tailors, abusively applied. SWEAT'Y, a. *-ĭ*, moist with sweat; laborious; toilsome. SWEAT'ILY, ad. *-lĭ*. SWEAT'INESS, n. *-nĕs*, the state of being sweaty. SWEATING-BATH, a hot bath which puts the body into a violent state of perspiration. SWEATING-ROOM, a room for maturing cheese. TO SWEAT COIN, to take away part of it by a process of friction without actual defacement.

SWEAT, or PERSPIRATION: moisture exuding through the pores of the skin. For the nature, composition, and uses of this fluid in the normal state, see SKIN. In the physiology of S., it is to be noted that the composition of the fluid varies materially according to the part of the body from which it is secreted. Thus Funk found the S. of the feet more abundant in fixed salts than that of the arm, in the ratio of 5 to 3; and Schotten found a considerable preponderance of potassium in the former. In the negro, observers have found that both the gaseous exhalations from the skin, and the solid matters in the S., were much greater than in the white races. The sweat-glands, like the lungs and kidneys, act as depurating organs, and separate and carry off effete matters from the blood (see SKIN): this eliminating action of the skin is modified in various diseases; in some cases being diminished, as in the early stage of fevers, in inflammations before suppuration commences, in scurvy, diabetes, sun-stroke, etc.; and more or less increased in the sweating stage of ague, in acute rheumatism, in Asiatic cholera, in certain adynamic fevers, in advanced stages of pulmonary consumption, in formation of matter in internal parts, etc. The S. is naturally acid in health, but in prolonged sweating the secretion becomes neutral, and finally alkaline. Little is known regarding the coloring matters of S. In cases of jaundice the S. sometimes communicates a yellow tinge to the body-linen; and instances of blue, red, and bloody S. are on record: see Simon's *Animal Chemistry* (Syd. Soc. Trans.), (Lond. 1845), II. 110. Cases of unilateral sweating, stopping abruptly at the middle line, have been occasionally noticed, especially in aneurism of the aorta: see Gairdner's *Clinical Medicine*, 557. For profuse perspiration, hot water is a remedy—serviceable in (1) oversweating in good health and hot weather; (2) undue sweating in special parts of the body, as the hands, feet, or armpits; (3) true hectic sweats; (4) ordinary night sweats in phthisis not preceded by hectic symptoms. To be of service, the water must be applied at as great heat as the patient can possibly bear.—For an interesting and learned discussion on the bloody sweat of the Lord Jesus during his Passion, consult Stroud *On the Physical Cause of the Death of Christ*, and Trusen's chapter, *Von dem Blutschweisse Christi* in his *Darstellung der Biblischen Krankheiten*, 1843.

SWEATING SICKNESS, The: extremely fatal epidemic disease, which ravaged Europe, especially England, in the 15th and 16th c. It appeared first 1485, Aug., in the army of Henry VII., shortly after his arrival at Milford in S. Wales from France, and in a few weeks it spread to the metropolis. It was a violent inflammatory fever, which, after a short rigor, prostrated the vital powers as with a blow; and amid painful oppression at the stomach, headache, and lethargic stupor, suffused the whole body with a fetid perspiration: all this took place in a few hours, and the crisis was always over within a day and night. The internal heat was intolerable, yet every refrigerant was certain death. '*Scarce one amongst a hundred* that sickened did escape with life.' Holinshed, III. 482. Two lord mayors of London and six aldermen died within one week; and the victims mostly were robust men. It lasted in London from Sep. 21 (or 15) till the end of Oct., during which short period 'many thousands' died from it. The physicians could do little or nothing to combat the disease, which at length was swept away from England by (as many supposed) a violent tempest on New Year's day. It reappeared in London in the summer of 1506, but seems to have been not very fatal. 1517, July, it again broke out in London in most virulent form; carrying off its victims in two or three hours. In many towns a third, or even a half of the inhabitants were swept away. This epidemic lasted about six months. In 1528, May—the year in which the French army before Naples was destroyed by pestilence, and in which the putrid fever *Trousse-galant* decimated the youth in France—the S. S. again broke out in London, spread rapidly over the kingdom, and 14 months later, brought a scene of horror upon all the nations of n. Europe, scarcely equalled in any other epidemic: see Hecker's *Epidemics of the Middle Ages* (Syd. Soc. Trans.), 238. How many lives were lost in this epidemic, which has been called by some historians *the great mortality*, is unknown. In the following summer (1529, July 25), having apparently died out in England, it appeared in the chief German cities; and in Sep. in the Netherlands, Denmark, Sweden and Norway; then in Lithuania, Poland and Livonia—numbering its victims by thousands. At the beginning of the next year it had disappeared from all these countries. After 23 years it appeared for the last time, breaking forth 1551, Apr. 15, in Shrewsbury, England, where, in a few days, it killed 960 persons. The disease spread rapidly over the whole of England, but seems to have disappeared by the end of Sep. Since 1551, no epidemic S. S. has occurred.

Its causes are not known; but it seems to have been allied to Miliary Fever or the 'Picardy Sweat,' of which it may have been a malignant and extreme type.

SWEDE, n. *swēd;* a native of *Sweden;* a variety of turnip originally from Sweden—the *Brassĭca campes'trĭs rutabāga.* Swedish, a. *swē'dĭsh,* of or from Sweden: in *agri.*, applied to a variety of turnip.

SWEDEN, *swē'dĕn* (*Sverige*): eastern and southern portion of the Scandinavian Peninsula (see SCANDINAVIA), constituting with Norway (q.v.) one joint kingdom: 55° 20′—69° 3′ n. lat., and 11°—24° e. long.; bounded n. and w. by Norway; extreme s.w. and s. by the Cattegat, which separates it from Denmark; s.e. and e., as far as 66° n. lat., by the Baltic and the Gulf of Bothnia; and thence to the extreme n. by Russia; greatest length n. to s. 986 m., breadth 250 to 286 m.; nearly 171,000 sq. m. S. is divided into three provinces—Norrland, largest and most northern; Sweden Proper, or *Svea-rike* (land of the Swedes), in the centre; and Götland or *Göta-rike* (land of the Goths) to the south.

Population.—The pop. is mainly rural. Pop. (1901, Dec. 31) census 5,175,228 (2,526,179 males, 2,649,049 females). The chief cities were Stockholm, the cap. (303,356), and Gottenborg (132,111). The Swedes belong, with Danes, Norwegians, and Icelanders, to the Scandinavian branch of the Teutonic stock. The following are the areas and population of the 25 län (districts) into which the provinces are subdivided.

DISTRICTS.	Sq. Miles	Pop. 1890, Dec.	Pop. 1901, Dec.
Stockholm	3,015	152,715	176,281
Upsala	2,051	121,097	125,043
Södermanland	2,631	154,989	167,888
Ostergötland	4,267	266,615	281,657
Jönköping	4,447	193,703	203,746
Kronoberg	3,825	160,389	159,266
Kalmar	4,443	232,848	228,117
Gotland	1,219	51,339	52,828
Blekinge	1,164	142,606	146,787
Kristianstad	2,486	221,697	219,459
Malmöhus	1,866	368,820	413,421
Halland	1,900	136,110	141,344
Göteborg and Bohus	1,948	297,780	340,402
Elfsborg	4,938	275,795	280,101
Skaraborg	3,280	247,075	240,907
Vermland	7,345	253,328	254,975
Orebro	3,498	182,556	196,462
Vestmanland	2,625	137,453	149,332
Kopparberg	11,522	197,452	220,116
Gefleborg	7,614	206,924	241,420
Vesternorrland	9,837	208,758	234,968
Jemtland	19,712	100,455	112,761
Vesterbotten	22,754	122,784	145,961
Norrbotten	40,870	104,783	138,630
City of Stockholm	13	246,154	303,356
Lakes Vener, Vetter, etc	3,516	.....	.....
Total	172,876	4,784,675	5,175,228

In 1878 S. ceded her only colony, St. Bartholomew (q.v.), to France (to which country it had formerly belonged) on payment of the purchase-money agreed on.

Unlike Norway, S. has few high mountains, but contains numerous large lakes. The coast of the Baltic, and the adjoining islands, are mostly low and sandy, though in some parts, as in the vicinity of the outlet of Lake Mae-

lar into the sea (about 58° n. lat.), the shores are steep; and on the s. and w. coast, the generally low, alluvial lands are replaced by more rocky formations.

In the n. parts, the land rises gradually from the Gulf of Bothnia to the Kjölen range, belonging to the great Norwegian Fjeldmark which constitutes the true watershed and natural boundary between S. and Norway. South of 62° n. lat., the slope is directed s., attaining its lowest level in the vicinity of the three great lake Vener, Maelar, and Hjelmar, which with the great Vetter Lake, nearly intersect the country from e. to w.; and s. of these great inland waters, the surface is in general level, though ranges of high ground and detached hills occur.

S. may be divided into three distinct parts—the n. or alpine region, the central or lake district, and the s. or mining district. The extreme s. includes the only level and fertile tract, in which wheat can at all times be advantageously cultivated. The lakes of S. have been computed to cover nearly $\frac{1}{8}$ of the entire area of the country: the largest are Lake Vener, Lake Vetter, and the Maeler Lake (q.v.). The rivers are generally short and rapid, and made navigable only by art: the largest is the Ångermann Elv, flowing into the Gulf of Bothnia. The Cattegat is connected with the Baltic by an admirable system of canals, etc.

Temperature, Natural Products, etc.—The differences of climate in S. are necessarily very great, considering that its most northern parts are more than 2° within the polar circle, and its s. extremity 11° s. of it, besides which many districts are so nearly surrounded by seas and lakes as to have the conditions of an insular position. Great extremes of temperature are common in different parts of S.: thus, while Stockholm has a mean annual temperature of 42°·2 Fahr., and Gottenborg 46°·3, the summer temperature of Stockholm is 60°·4 Fahr., and that of Gottenborg 62°·13; and the winter temperature of Stockholm only 25°·8, and that of Gottenborg 31°·5 Fahr.

The heat of the summer, scarcely separated from the cold of the winter by spring or autumn in extreme n. districts, enables the inhabitants to cultivate barley, which is reaped within two months of the time of its sowing, though even the hardier cereals, as oats and rye, will not ripen above the parallel of 66° n. lat. Indeed the climate of S. generally is unfavorable to grain, the annual yield of which frequently falls short of the wants of the population. The principal articles of cultivation besides various cereals, are potatoes, hemp, flax, tobacco, and hops, generally in sufficient quantities for home consumption. The forests are of great extent, covering nearly one-fourth of the entire surface, and in some places 3,000 ft. above sea-level. The birch, fir, pine, and beech are of great importance, not only for the timber, tar, and pitch which they yield, but also for supplying charcoal and firewood. Above the parallel of 64°, stunted bushes, berries, dwarf-plants, and lichens are the only forms of vegetation. The common fruit-trees, e.g., cherries, apples, and pears,

grow as far n. as 60°, but the fruit seldom comes to perfection except in the s. provinces; cranberries and other berries abound, however, in all parts of the country. Bears and beavers, formerly numerous, are becoming scarce; but wolves, lynxes, foxes, martens, squirrels, eagles, reindeer in the Lappmarks, etc., are still common; while the elk and deer are found in some of the forests, which also abound in hares, woodcocks, blackcock, and various other small game; and Lemmings (q.v.) occasionally descend from the mountains in large numbers, and lay waste the low country. The lakes yield great abundance of fish, 88 different kinds of sea and freshwater fish being brought to market. In 1893, there were in S. 495,443 horses, 2,473,981 head of cattle, 1,323,978 sheep and lambs, 112,308 goats, and 717,339 swine.

The mineral products of S. are extremely rich, including some gold and silver (which do not pay the cost of working), copper in abundance, iron of the finest quality, alum, vitriol, marble, sulphur, lead, plumbago, cobalt, nickel, zinc, and coal of very poor quality.

Next to agriculture, mining is the most important national industry, and in some provinces is the principal employment. The Danemora mines, in Upsala län, yield a metal capable of being converted into the finest steel, and which mostly is purchased for the English market. At Gellivare in south Lapland, enormous quantities of iron ore of superior quality have recently been extracted from mines, which promise to rival those in Upsala.

Ship-building is an extensive local industry. The merchant marine numbered (1901) 2,076 sailing vessels of 288,687 tons, and 911 steam vessels of 325,105 tons. During 1900 the entrances at the port of S. were 36,261 vessels of 8,543,539 tons; clearances 36,300 vessels (including 16,827 foreign), of 4,579,589 tons.

Exports and Imports.—The chief articles of export are, in the order of value: timber (beams, deals, masts, spars, pit-props), iron and steel, oats and barley, butter, lucifer matches, cattle, sheep, swine, paper, wood-pulp, copper and zinc-blende. The imports are mainly coal, coffee, sugar, rye and flour, woolen manufactures and wool, dressed skins, herrings, mineral oil, machinery, pork, salt, spirits, and tobacco. Less than half the total exports (1888) went to Great Britain, the countries next in order being Denmark, France, Germany, Norway, Holland, Belgium, Spain, Finland, Mediterranean ports, Russia, Austria, Portugal, and the United States. About a fourth of the imports were from Germany, Great Britain sending nearly as much; next were Denmark, Norway, Russia, Belgium, Finland, Netherlands, France, United States, E. India, Portugal, and Spain. Total imports including precious metals (1899) were $112,716,820; exports $98,876,870.

Revenue, etc.—The revenue is from direct and indirect taxation, state property, railways, customs, etc. The budget for 1903 gave the annual receipts at $46,566,409, and the expenditure at about the same amount. The frequent surplus of expenditure, due almost invariably to the

prosecution of national and public works, is formally sanctioned by the diet, which annually provides means for covering the deficit by appropriation of certain state funds for the purpose, and by levying a general income-tax. The national debt 1902, Jan. 1, was about $95,000,000.

Army, Navy, etc.—The Swedish army has a peculiar organization; as it consists, in addition to the Värfvade or enlisted troops, of the 'Indelta,' or cantoned militiamen, maintained at the cost and on the property of the landed proprietors: each estate being mulcted according to its value or extent to maintain one or more men, and provide them with 'torps' or cottages, a certain portion of land, and a fixed rate of payment. In return, these reserve soldiers, mostly married men, serve the proprietor as field-laborers in times of peace, except when called out for drill. In time of war, they can be sent with the companies in which they are enrolled into active service, and they are then paid by the crown. The milit. law of 1887, Jan. 1, required every male 21 years old to serve 6 years in the active army and 6 in the landstorm, but the requirements are not enforced, particularly in the Indelta, whose troops are in service for instruction 120 days the first year, 50 days the second, and 30 days in succeeding years. The regular army comprised (1901) 37,200 officers and men, 240 guns, and 9,808 horses; and the reserves 1,424 officers and men—total 38,624 officers and men. The navy, maintained wholly for coast defence, comprises 7 turret ships, 5 other armored ships, 5 torpedo boats, 1 destroyer of 31 knots, 26 tor. boats and 1 submarine. There are also several gunboats and train. ships and 11 monitors for coast service. Including the reserve there are 382 officers.

Form of Government.—S. is a hereditary and constitutional monarchy, based on the fundamental law of 1809, by which it was decreed that the succession should be in the male line; that the sovereign should profess the Lutheran faith; and have sworn fidelity to the laws. The diet, which meets every year, for a session of three or four months, is composed of two chambers, both elected directly or indirectly by the people. The first chamber consists of 150 members, who receive no pay, and are elected for nine years by the communal authorities: they must be possessed of an income of about $1,000 and have attained the age of 35. The second chamber is composed of 230 members elected for three years by direct suffrage in cities and towns, and direct or indirect in rural districts, as the majority decides; and receiving payment for their attendance during each session of the diet, and for their travelling expenses. The diet exercises strict control over the expenditure of the revenue, fixes the budget, and has power to take cognizance of the acts of the ministers and crown officers. The king is the supreme head of the law courts, nominates to all appointments, can declare war, make peace, and conclude foreign treaties. He is assisted by a council of state composed of ten members, responsible to the diet.

Religion.—The predominant form of religion in S. is the

Lutheran; the census of 1890 showing 44,378 Prot. dissenters (mainly Baptists), 1,390 Rom. Catholics, 234 Mormons, 3,402 Jews, and a few representatives of other forms of faith. The affairs of the national Lutheran church are administered by 1 archbishop (of Upsala) and 12 bishops, whose dioceses included (1902) abt. 2,572 parishes. Since 1880 there has been a noticeable growth of Prot. dissent: see SWEDISH DISSENTING CHURCHES.

Literature.—For the ancient literature of Sweden see SCANDINAVIAN LANGUAGE AND LITERATURE: for its ancient religion, see SCANDINAVIAN MYTHOLOGY. The language is one of the main branches of the old Scandinavian, like the Danish Language (q.v.) and that of Norway (q.v.). In literature, the middle ages produced a few popular poems, histories of saints, rhyming chronicles, and the like. After the Reformation began a period of vigor, fostered by the translation of Scripture (by Olaus Petri and others). Poetry was modelled at first on Italian and German patterns, Stjernhelm, 'father of Swedish poetry,' belonging to this period. In the 18th c., French influence was dominant; the age of Gustaf III. producing the poets Kellgren (d. 1795), Bellmann, Gyllenborg, Oxenstierna, Leopold (d. 1829). The reaction against Gallicism led to the growth of two schools, to the one of which, called Phosphorists, belonged Atterbom (d. 1855), Hammarskjöld, Palmblad (q.v.), and Dahlgren. These were somewhat overstrained romanticists; romantic also, but with more national and local coloring, were the Gothic school, including Geijer (q.v.), Tegner (q.v.), Ling, and Afzelius. Other eminent names are Stagnelius, Sjöberg, Runeberg. Among romance writers are Bremer (q.v.), Carlen (q.v.), Almqvist. Fryxell (q.v.) and Malmström are notable historians. In science, Sweden has Linné (q.v.), prince of botanists, and Fries (q.v.), Berzelius (q.v.), and Scheele (q.v.), chemists.

Education.—Education is universally diffused by the agency of *Fasta* (regular) and *Flyttanda* (ambulatory) schools in all the country districts. There were (1900) 11,981 elementary schools with 16,630 teach. and 707,067 pupils; there were 79 public high schools (1901), with 18,085 pupils. Public instruction is compulsory for all children, and the cost is defrayed by the nation. Ample means are supplied for higher instruction in the Lärovärk or Gymnasia of the towns, and at the universities of Upsala and Lund. The Karolingska Institute at Stockholm is the medical college of S.; and there are numerous technical, military, and other special collegiate institutions in the principal towns of the kingdom. The transactions of the two learned societies, the 'Svenska Vetenskaps Selskap,' and the 'Svenska Akademie,' afford honorable testimony to the advanced condition of scientific inquiry in Sweden. The Royal Library of Stockholm, and those of Upsala and Lund, number about 100,000 vols. each: that of Upsala is in a special building, *Carolina Rediviva*, to which is attached a botanical garden arranged on the Linnæan system.

Railroads, Telegraph, and Post-office.—In 1900 there were 7,023 m. of railroad in operation, of which 2,392 m. belonged to the govt., and 4,631 to private companies, including a line extending to the Gellivera mines on the Nor. border. The total number of pass. carried was 30,-191,181, There were about 100,000 m. of telephone wire and 81,000 instruments. The telegraph lines belonging to the state had 5,718 m. of line and private lines had 4,738 m. The govt. owned or had an interest also in about 150 m. of cable line. The post-office handled 273,-821,837 letters, postal-cards and newspapers. The number of post-offices 1901, Jan. 1, was 2,937.

History.—The legendary history of S. forms part of Scandinavian history. When we hear first of S., the country was inhabited by numerous tribes, kindred in origin, but politically separate. Two principal groups, however, are recognizable—*Goths* in the s., *Swedes* in the n. These possessed in common a national sanctuary, the temple at Upsala, which laid the basis of a later unification, for gradually the royal chieftains of Upsala extirpated the inferior princes, the Härads and the Fylkis. Ingiald Hrada, last ruler of the old royal family of the Ynglingar, who drew their origin from Njord, sought to establish a single govt. in Sweden, and perished in the attempt. To the Ynglingar followed, in Upland, the dynasty of the *Skioldungar*, which claimed to be descended from Skjold, son of Odin. Erik Edmundsson, who belonged to this dynasty, is said to have acquired the sovereignty of the whole of Sweden about the end of the 9th c. The dawn of Swedish history (properly so called) now begins, and we find the Swedes constantly at war with their neighbors of Norway and Denmark, and busily engaged in piratical enterprises against the e. shores of the Baltic: see NORMANS: RUSSIA. Efforts to introduce Christianity (see ANSGAR) were made as early as 829, but it was not till 1000 that Olof Skötkonung, the Lap-king, was baptized, nor did the struggle between heathenism and the new religion cease till the burning of the temple of Upsala in the reign of Inge (1080–1112). In 1155, Erik, surnamed the Saint, gave a powerful impetus to the spread of Christianity by building churches and founding monasteries. He undertook a crusade against the pagan Finns, and having compelled them to submit to baptism, and established Swedish settlements among them, he laid the foundation of the union of Finland with Sweden. Erik's defeat and murder 1160, by the Danish prince, Magnus Henriksen, who had made an unprovoked attack on the Swedish king, was the beginning of a long series of troubles, and during the following 200 years one short and stormy reign was brought to a violent end by murder or civil war, only to be succeeded by another equally short and disturbed. At length, 1389, the throne was offered by the Swedish nobles to Margaret, Queen of Denmark and Norway, who, having gladly availed herself of the opportunity thus opened to her of uniting the three Scandinavian crowns into one, threw an army into S.; defeated the

Swedish king, Albert of Mecklenburg, who, on the deposition of his maternal uncle, Magnus, had been called to the vacant throne; and by the union of Calmar 1397, brought S. under one joint sceptre with Denmark and Norway. In 1523 S. freed itself from the union with Denmark, which, during the reigns of Hans and his son Kristian II. (see DENMARK), had become hateful to the Swedes; and rewarded its deliverer, young Gustaf Vasa (see GUSTAVUS I.), by electing him king, and declaring its independence of Denmark. Gustaf Vasa found an empty treasury, a kingdom exhausted by war, a haughty nobility and clergy (who arrogated the right of electing the sovereign, and who claimed exemption from all imposts), and a people overburdened with taxation and bad government, and divided in religion. On his death, 1560, he left to his successor a hereditary and well-organized kingdom (in which the power of the nobles had been circumscribed, and that of the clergy broken, by the abrogation of Rom. Catholicism, and the firm establishment of the Reformed Church under the jurisdiction of the state), a full exchequer, a standing army, and a well-appointed navy. Trade, manufactures, arts, learning, and science owed their advancement in S. to this patriotic king.

The collossal labors of the great Vasa in raising a semi-barbarous state to an honorable place among the civilized monarchies of Europe, were rendered almost useless by the crimes and misfortunes of his son and successor, Erik XIV., whose high intellectual powers were clouded by a wayward and revengeful nature, ending in insanity. His cruelties and excesses led to his deposition 1568, when his younger brother Johan ascended the throne, which he occupied nearly a quarter of a century, dying 1592, after a stormy reign, stained by the cruel murder of his unfortunate brother Erik, and distracted by the internal dissensions arising from his attempts to force Rom. Catholicism on the people, and to carry on war with the Danes, Poles, and Russians. Johan's son and successor, Sigismund, who had been elected king of Poland through the influence of the relatives of his Polish mother, after a short and stormy reign of eight years, which were spent in attempting to restore Rom. Catholicism in S., was compelled by the diet to resign the throne 1599 to his uncle Karl, the only one of Gustaf Vasa's sons who inherited any share of his legislative and administrative talents. The policy of Karl IX. was to encourage the burgher classes at the expense of the nobility; and by his successful efforts to foster trade—in furtherance of which he laid the foundation of Göteborg and other trading ports—to develop the mineral resources of the country, and to reorganize the system of Swedish jurisprudence, he did much to retrieve the calamitous errors of his predecessors. The deposition of Sigismund gave rise to the Swedo-Polish war of succession 1604–60; and on the death of Karl 1611, his son and successor, the great Gustavus Adolphus, found himself involved in hostilities with Russia, Poland, and Denmark. By the ability of his minister, Oxenstierna, the young king was soon en-

abled to conclude treaties of peace with his northern neighbors, and to place the internal affairs of his kingdom in order (see GUSTAVUS II.); and though he justly ranks as one of the greatest military commanders of his age, the extraordinary number of benefits which he conferred on every department of the administrative system of S., entitle him to still greater renown as the benefactor of his native country. His death 1632, on the field of Lützen, would have proved an irreparable calamity to S. had not the able administration of Oxenstierna, during the minority of Gustavus's daughter Christina, maintained the renown of the Swedish arms abroad, and the political reputation of the country among other states. The reign of Christina (q.v.) was disastrous in every act but that of her abdication. The short reign of Karl X. was occupied in generally unsuccessful wars against Poland and Denmark; while the minority and long rule of his son, Karl XI.—1660–97—was characterized by success abroad, and by the augmentation of the regal power, which was declared by an act of the diet to be absolute. His son Karl, known to us as Charles XII. (q.v.), succeeded, at the age of 15, to the power and dominions which his father's abilities had consolidated, but which, notwithstanding his own brilliant genius, he so deeply imperilled by his insatiable ambition, that at his untimely death 1718, at the siege of Frederikshald, after a brilliant career of glorious but checkered military achievements, he left his country overwhelmed with debts, and disorganized by prolonged misrule. With him the male line of the Vasas expired, and his sister and her husband, Frederick of Hesse-Cassel, were called to the throne by election, but were the mere puppets of the nobles, whose rivalries and party dissensions plunged the country into calamitous wars and almost equally disastrous treaties of peace, and, under the leadership of the two great factions of the 'Hats,' or French party, and the 'Caps,' or Russian party, demoralized all ranks of society. The weak Adolphus Frederick of Holstein-Gottorp, called to the throne on the death of Frederick 1751 (d. 1771), did little to retrieve the evil fortunes of the state; but his son, Gustavus III. (q v.) (1771–92), skilfully turned to account the general dissatisfaction of the people with the nobles, to destroy the factions of the Hats and Caps, and to recover the lost power of the crown. His extravagance, dissoluteness, and insincerity detracted, however, from his merits as a ruler, and raised up numerous enemies against him, through whose agency he was assassinated 1792. His son and successor, Gustavus IV. (q.v.), lacked the ability to cope with the difficulties of the times, and after suffering in turn for his alliance with France, England, and Russia, was forcibly deposed 1809, and obliged to renounce for himself and his direct heirs the crown in favor of his uncle, Charles XIII., who saw himself compelled at once to conclude a humiliating peace with Russia by the cession of nearly a fourth part of the Swedish territories, with 1½ million of inhabitants. The early part of the reign of Charles, who was childless, was troubled by domestic and

foreign intrigues to regulate the choice of an heir to the throne; and when, under the erroneous idea of conciliating Napoleon, the dominant party in S. elected Gen. Bernadotte to the rank of crown prince, the latter assumed the reins of government, and by his steady support of the allies against the French emperor, secured to S. at the congress of Vienna, the possession of Norway, when that country was separated from Denmark. Under the able administration of Bernadotte, who, 1818, succeeded to the throne as Charles XIV., the united kingdoms of S. and Norway made great advances in material prosperity and political and intellectual progress; and though the nation at large had little personal regard for their alien sovereign, his son and successor, Oscar (1844-59), and his grandsons, the late king, Charles XV., and the present king, Oscar II., who came to the throne 1872, have secured for the Bernadotte dynasty the loyal regard of the united nations. Recently, however, discontent has arisen in Norway. A convention at Hamar 1889, June, gave voice to the rising sentiment of the people in resolutions demanding the abolition of the Norwegian vice-royalty; the abolition of the Norwegian delegation in the council of state in Stockholm; the regulation of diplomatic affairs in the manner proposed by Sverdrup 1885; and the abolition of the union symbol in the Norwegian flag.

SWEDENBORG, *swē'dĕn-borg* (or SVEDBERG, *svĕd'bĕrg*), EMANUEL: 1688, Jan. 29—1772, Mar. 29; b. Stockholm; son of Dr. Jesper Svedberg, subsequently Bp. of Skara, a learned and pious man who believed himself to be in intercourse with angels. S.'s lifetime divides itself into two distinct periods: the first, ending with his 55th year, was given to business, science, and philosophy; the second, nearly 30 years, was consecrated to theology and spiritualism. S. was educated at Upsal, and travelled four years in England, Holland, France, and Germany. On his return to Sweden, he was appointed by Charles XII. assessor of mines; and rendered some service to that monarch as milit. engineer. The S. family was ennobled 1719, and the name changed from Svedberg to S., whence S. is sometimes erroneously styled Count and Baron. His mind at this time was busy with mechanical and economical projects. He published short treatises on algebra, giving the first account in Sweden of the differential and integral calculus; on a mode of finding the longitude at sea by the moon; on decimal money and measures; on the motion and position of the earth and planets; on the depth of the sea, and greater force of the tides in the ancient world; on docks, sluices, and salt-works; and on chemistry as atomic geometry. In 1724 he was offered the professorship of mathematics at Upsala, which he declined. Abandoning his desultory studies, he quietly pursued for 11 years his official duties, preparing a systematic description of mining and smelting; but also devoting his singularly original mind to the construction of a theory of the origin of creation. As early as 1721 he had engaged in the search for a scientific theory of the universe. The result appeared at Leipzig 1734, in three massive folios, beautifully illustrated, *Opera Philosophica et Mineralia.* Vols. II. and III. describe the manufacture of copper, iron, and brass, with an exhaustive record of the best methods then in use. Vol. I., *Principia, or the First Principles of Natural Things, being New Attempts toward a Philosophical Explanation of the Elementary World,* is an elaborate deduction of matter from 'points of pure motion produced immediately from the Infinite.' This was followed 1734 by a treatise on *The Infinite, and the Final Cause of Creation; and the Intercourse between the Soul and the Body,* carrying the doctrine of the *Principia* into higher regions, and resolving the soul into points of motion, and one in substance with the sun. Dissatisfied with his conclusions, he determined to track the soul to its inmost recesses in the body: his studies in human anatomy and physiology with this end in view appeared as *Œconomia Regni Animalis,* 2 vols., 1741, and as *Regnum Animale,* 3 vols., unfinished, 1744–5. At this point, when he had risen to the highest rank in the world of science, his course was arrested, and he entered on his career as seer, by which he is known to fame. The particulars of this transition lay in obscurity until 1858, when G. E. Klemming, royal librarian, Stockholm, discovered S.'s diary, kept in 1744. It contains the record of a variety of dreams, visions, and strange communings. After that

date, he believed himself to have free access to heaven and hell. He resigned his assessorship 1747, that he might devote himself to his office of seer. In 1749 he made his first public appearance in his new character in the issue in London of *Arcana Cœlestia*, completed 1756 in 8 quartos. His life thereafter was spent in Stockholm, London, and Amsterdam, in writing and printing many works in exposition of his experience and doctrines. These in their main substance are comprised in the *Arcana Cœlestia*.

With many digressions, the *Arcana Cœlestia* is a revelation of the inner sense of the books of Genesis and Exodus: the following is a bare outline of it. The early chapters of Genesis are a fragment of an older Word, preserved at this day in Tartary, and are not historical in a matter-of-fact sense. Adam signifies the most Ancient Church, and the Flood its dissolution; Noah, the Ancient Church, which, falling into idolatry, was superseded by the Jewish. The spiritual sense pervades the Scriptures, except Ruth, Chronicles, Ezra, Nehemiah, Esther, Job, Proverbs, Ecclesiastes, the Song of Solomon, the Acts of the Apostles, and the Epistles. No fault is found with these excepted books, but, inasmuch as they do not possess the internal sense, they are not the Word. The Word has a threefold sense, natural, spiritual, celestial. The Scriptures are read in heaven in their higher sense; but as that sense treats exclusively of God and the human mind, it is void of every reference to earthly scenes, persons, and events. By reason of its symbolism of the inward sense, the letter of Scripture is holy in every jot and tittle, and has been preserved in immaculate perfection since the hour of its Divine dictation. The Jewish dispensation having reached its period, God appeared in Jesus Christ. He assumed human nature in its basest condition in the Virgin, wrought it into conformity with Himself, 'glorified and made it divine.' The effluence from the redeemed humanity is the Holy Spirit. God is the Divine Man. In a sense utterly the reverse of Socinian, S. was a Unitarian—i.e., while denying three distinct persons in the Godhead, he regarded the Lord Jesus Christ as the only God and the sole object of worship. In the one Person of Christ is a Trinity of Father, Son, and Holy Spirit; the Father being Christ's infinite Divine nature or soul, the Son his glorified human nature or Divine body, the Spirit the life proceeding from his Divine humanity for human salvation. S. utterly rejected the standard doctrine of the atonement, and of man's salvation by faith alone—teaching instead that man is saved by a life according to the Word. The church initiated by the Divine incarnation came to an end in the 18th c.; and S. witnessed the 'Last Judgment,' which was effected in the year 1757 in the World of Spirits by the second coming of the Lord. Then commenced a new dispensation, signified by the New Jerusalem in the Revelation, of which S. was the precursor, and his writings the doctrine. To the objection that the doctrine is strange and novel, he replied that mankind were not prepared for its reception, and that the early Christians were too simple to understand it. He de-

clared that his doctrines were communicated to him by direct Divine illumination opening his spiritual eyes.

One of the chief ends of his mission was the revival of the lost science of 'correspondences'—the science of sciences in the most ancient times. The law of correspondence is universal; the natural world is the outbirth of the spiritual world, and the spiritual world of the invisible mental world. The natural world and the spiritual world are perfectly distinct; but the two are connected in a system of correspondences so intimate and perfect that the natural is the symbol of the spiritual. Unseen evil comes into manifestation in things hurtful and ugly; unseen good, in things useful and beautiful. Man is a summary of nature; nature is man in diffusion; all things, therefore, in nature, in fire, air, earth, and water—every beast, bird, fish, insect, and reptile, every tree, herb, fruit, and flower—represent and express unseen things in the mind of man. The Scriptures are written according to correspondences, and by aid of the science their mysteries are unlocked. By it, too, the constitution of heaven and hell is revealed. There are three heavens, consisting of three orders of angels; the first distinguished for love, the second for wisdom, and the last for obedience. All angels have lived on earth; none were created such. They are men and women in every respect; they marry, and live in societies in cities and countries just as in the world, but in happiness and glory ineffable. All in whom love to God and man is the ruling principle go to heaven at death. Between heaven and hell, a perfect equilibrium is maintained. As there are three heavens, there are three hells, and every angelic society has an infernal opposite. Hell, as a whole, is called the Devil and Satan; there is no individual bearing that name. All in whom self-love is the ruling motive go to hell. Heaven and hell are constantly in and around the natural world and its life: men are living unconsciously in either of the two according to their highest love—the supreme love of God being heaven; the supreme love of self, hell. There is no resurrection of the earthly body. Every one passes at death to his final lot; some making a short sojourn in an intermediate state, designated the World of Spirits, where the good are cured of their superficial infirmities and intellectual mistakes, and where the evil are stripped of all their pretenses to good.

S. claimed extensive acquaintance with departed celebrities through many conversations with them in his visits to the spiritual world; and some of his verdicts on character are appalling—e g., he describes King David and the apostle Paul as among the lost, while Louis XIV. and George II. are distinguished angels. He did not confine his intercourse to spirits departed from earth, but extended it to souls from the moon and planets, with the exceptions of Uranus, Neptune, and the Asteroids. For these visions, which came to him while sitting in his chamber, he had this explanation: though in the spiritual world there are *appearances* of space, there is nothing of the objective reality which here divides London from Melbourne. If one

spirit desires to see another, the desire instantly brings them together. A good man is, as to his mind, in heaven, and an evil man in hell; and supposing the spiritual sight of either was opened—that is, if the eyes of the spiritual body, which transfuse and animate the material eyes, were disengaged from their fleshly vesture—he would see his spiritual companions and the country where he would abide after death.

The grand and distinctive principle of Swedenborgian theology, next to the doctrine of the Divine Humanity, is the doctrine of life. God alone lives. Creation is dead—man is dead; and their apparent life is the Divine presence. God is everywhere the same. It fallaciously appears as if He were different in one man and in another: the difference is in the recipients; by one He is not received in the same degree as by another. A man more adequately manifests God than a tree; that is the only distinction. The life of devils is God's presence perverted in disorderly forms. 'All things, and each of them to the very uttermost, exist and subsist instantly from God. If the connection of anything with Him were broken for a moment, it would instantly vanish; for existence is perpetual subsistence, and preservation perpetual creation.' By this law of life is explained man's self-consciousness, freedom, and personality. All these sensations are communicated from God to man. He dwells in man so cordially, that He gives man to feel that he lives of himself, even as He lives.

S. made no attempt to establish a sect. When he proclaimed the Christian Church at an end, his expectation was, that a new church would be raised up among the Gentiles; but toward the close of his life he was silent as to that hope, and spent his energies in attacking Prot. theology, as if bent on the conversion of n. Europe. All his works were in Latin: they comprise about 30 octavo vols. They received little attention from his contemporaries. Largely made accessible through English translations, they have in recent years drawn increasing regard in Britain and in the United States: see SWEDENBORGIANS. Apart from his visions, there was nothing peculiar about S., except that he was very simple in his habits (a vegetarian in diet); and that he evinced rare powers of scientific observation, with unusual intellectual gifts—especially in the line of classification, co-ordination, and system-building. He was shrewd in worldly affairs, affable in society—winning respect and confidence from all who associated with him; and discussed politics and finance in the Swedish diet like a man of the world. He was never married.

S. was, beyond question, one of the most remarkable men that ever lived. It is not possible here to discuss his amazing claims, nor the extreme anthropomorphic and allegorizing nature of his system, with its theological exclusiveness unavoidable on his principles. The number of his followers is small, inasmuch as some peculiar intellectual gifts, including a highly spiritualized tendency in thought and feeling, are requisite even fairly to grasp his teaching; but, undeniably, he has widely influenced theo-

logical thinking. Many men, eminent in various branches of the church—though failing to see the proof of his claims, or to accept his system as divinely revealed truth—have yet been stirred by him to new, more suggestive, more spiritual views, if not of Christian doctrine, at least of that philosophy which pertains to the nature of man as an inhabitant of the two worlds, visible and invisible.—See Dr. R. L. Tafel's *Documents Concerning the Life and Character of S.*, 3 vols.; Worcester's *Life of S.;* James J. G. Wilkinson's *Emanuel S., a Biography;* William White's *S., His Life and Writings;* Hobart's *Life of S.* (See also SWEDENBORGIANS.)

SWEDENBORGIAN, n. *swē'dĕn-bor'jĭ-ăn:* one who holds the doctrines of the New Jerusalem Church, as taught by Emanuel Swedenborg (q.v.): ADJ. pertaining to. SWE'DENBOR'GIANISM, n. *-ăn-ĭzm,* the doctrines of.

SWE DENBOR'GIANS, properly THE NEW JERUSALEM CHURCH: religious body composed of the followers of Emanuel Swedenborg (q.v.), who proclaimed a new dispensation, revealed to him by direct communication with the Lord and with angels. By reason of the spiritual sense which Swedenborg saw in the Scriptures, his followers give great importance to the Word and to its higher interpretation in their private and public exercises—much more than to any other service—prayer being mostly confined to the Lord's Prayer, and music to scriptural chants and anthems. The doctrines of Swedenborgians include the Divine Unity and Humanity; the Deity as essential love, manifesting itself in wisdom; the Divine likeness in man; the gradual fall of man from spiritual enlightenment by separation from God and exalting self; redemption by the Father assuming humanity, and in the person of Jesus Christ purifying and glorifying it, until, after the last temptation of the cross, the Lord was wholly Divine, even his body a risen Divine body. The Holy Spirit is an emanation of love and wisdom from the Lord, and, with the essential Divinity and the Divine Humanity, constitutes the Trinity. Regeneration is such renunciation of sin in the inmost affections that the spiritual mind, existing latent (and in the lost forever latent), is opened to the influx of the Divine; and it is consummated in the opening of a third and higher capacity or degree of man, the heavenly. Brute animals have only the first degree, the natural mind; and, not capable of receiving the Lord, are not immortal. But all nature is a reflection of the spiritual, on which all life depends. The doctrines concerning the unseen or spiritual world have a large place in the Swedenborgian belief; and their terminology is closely adhered to: see SWEDENBORG, EMANUEL. The statistics of 1890 give, in the United States, 154 churches or organizations, 87 church edifices, 70 halls, 7,095 communicants—the states having the most organizations being Mass. 22; Ill. 14; O. and Penn. each 13; Cal. 12; N. Y. 11; Md. 9; the others each 6 or less. There are 103 pastors, 8 general pastors, 10 preaching candidates. The board of publication, besides books, had disposed of 30,000 tracts. The theol. seminary

at Cambridge had 6 students. Missionaries were employed in Denmark, Sweden, Italy, and Trinidad.—There were in England and Scotland 75 societies; in Sweden 14; France 13; Australia 13; Italy 9; Germany 8; Switzerland 7; s. Africa 7; Denmark 4; and a few elsewhere.

SWE'DISH DISSENTING CHURCHES: mostly churches that began in groups of persons who so far separated themselves from the national Lutheran Church, 1860–70, as to observe the Lord's Supper privately, and hence were called Lord's Supper or Communion societies. These were merged in mission societies for Christian work, and gradually took the form of church organizations with no common name; the societies were also locally called Brothers' Church, Angasarii Society, and Church of Christ, or Local Church, or God's Church, at such and such a place. From about 1874 the movement became rapid, and 1878 the Swedish Missionary Union was formed, with annual delegates and mass-meetings, quarterly district association meetings, and a ministers' yearly conference. At the same time a confession of faith and rules of church govt. were adopted. In 1880 a more complete organization was formed under the name Mutual Christian Free Church, but commonly called Free churches. In 1885 it numbered about 400 churches, with more than 100,000 members. Besides its missionaries employed in Norway, it had 22 foreign missionaries, distributed in Russia, Finland, Lapland, and two in Africa. A school under its auspices was founded 1871, another 1882. The movement has extended not only eastward but into Norway and Denmark; also among the Swedish emigrants to the United States, where in 1884 there were 80 churches, several periodicals, and a college at Knoxville, Ill. The churches are purely congregational in polity, and this form originated spontaneously from study of the N. Test.—The Baptists of the U. S., from 1853, have shown much zeal in their missions in Sweden, numbering (1885) 27,000 members there; and the Methodists, beginning with a mission from England, counted 7,000.—The Swedish Lutheran National Church made all citizens members, the king its head, and piety not essential to valid administration of the sacraments. The revolt against all this led to the Lord's Supper societies, above noted. About 1840 a religious awakening began in the state church, influenced by the preaching, and writings of Karl Olaf Rosenius. This, and prosecution (till 1860) of separatists from the state church, with fines, confiscation, and imprisonment, promoted the new movement instead of preventing it. Full religious liberty was established 1877. It was a practical and devout revolt, not at all theological; though in some places extreme views were entertained relative to the application of free grace. The accusations of Donatism, Socinianism, Antinomianism, etc., have been strongly denied by the prominent leader Rev. Dr. P. Waldenström (q.v.), whose name has been used for a derisive designation of the Free churches—Waldenströmian.

SWE'DISH LANGUAGE AND LITERATURE: see SWEDEN: also SCANDINAVIAN LANGUAGE AND LITERATURE.

SWE'DISH MOVE'MENT CURE: see MOVEMENT CURE.

SWEEP, v. *swēp* [Icel. *sópa*, to sweep, to wipe; *sópr*, a besom: W. *ysgub;* Gael. *sguab*, a besom: Bret. *skuba*, to sweep: L. *scopæ*, thin branches, twigs, a besom]: to brush or rub off with a broom or besom; to clean or remove, as by the motion of a broom; to strike or remove with a long stroke; to pass over with swiftness and violence, as the wind or water dashed over a surface: to carry or drive off with quickness and violence; to destroy or carry off, as by a pestilence; to pass with pomp; to draw over, as a net on the bottom of a river: N. the act of brushing off with a broom; the length of reach or swing of a moving body; any part of a ship shaped in a segment of a circle; a rapid survey with the eye; the direction of any motion not in a straight line; range; a chimney-sweep: an oar of great length used in large vessels during a calm, to obtain steerage-way. SWEEP'ING, imp., ADJ. moving or driving; brushing over, as with a broom; cleaning with a broom; comprehending many persons or things: N. the act of one who or that which sweeps. SWEPT, pt. pp. *swĕpt*. SWEEPER, n. *swēp'ĕr*, one who sweeps. SWEEP'INGLY, ad. *-li*. SWEEP'INGS, n. plu. *-ingz*, refuse; rubbish. SWEEPS, n. plu. among *seamen*, large oars used to propel small vessels in a calm. SWEEPY, a. *swēp'i*, passing with a sweeping motion, or with speed; strutting; wavy. SWEEP-NET, a large net for drawing through a large extent of water. SWEEPSTAKES, n. plu. *-stāks*, a wager in which a number of persons take shares according to the number of possible results, the winner receiving all the stakes. SWEEP-WASHER, one who extracts from the sweepings and refuse of workers in gold and silver the lost particles of the precious metals. CHIMNEY-SWEEP, one who cleans chimneys.

SWEET, a. *swēt* [AS. *swete;* Dut. *zoet;* Dan. *söd;* Icel. *sætr;* L. *suāvis*, sweet]: grateful to the taste or smell; pleasing to any of the senses; having the taste of sugar or honey; not sour, as fruit; soft; harmonious; unsalted; pure; mild; gentle; fresh; not stale; not putrescent: N. something pleasing or grateful to the mind; a sweet substance; a word of endearment. SWEETS, n. plu. cane-juice; confections made of or seasoned with sugar; in *England*, home-made wines, etc. SWEET'LY, ad. *-li*. SWEET'NESS, n. *-nĕs*, the quality of being sweet in any of its senses; fragrance; melody; gentleness; softness; mildness. SWEET'ING, n. *-ing*, a sweet apple; a term of endearment. SWEET'ISH, a. *-ish*, somewhat sweet or grateful to the taste. SWEET'ISHNESS, n. *-nĕs*, the quality of being sweetish. SWEETEN, v. *swēt'n*, to make sweet; to become sweet; to restore to purity or freshness; to render grateful or pleasing to the mind; to palliate; to make less painful. SWEETENING, imp. *swēt'ning*: N. act of making sweet; that which makes sweet. SWEETENED, pp. *swēt'nd*: ADJ. made sweet, mild.

or grateful. SWEETENER, n. *swēt'nĕr*, one who or that which sweetens. SWEET-SCENTED, or SWEET-SMELLING, a. fragrant. SWEET-TEMPERED, a. gentle and mild in disposition and manners. SWEET-BAY, the victor's laurel whose leaves crowned the conquerors in battle and in the Olympic games; the *Laurus nobilis*, ord. *Laurāceæ*. SWEETBREAD, a long, flat, glandular, fleshy substance lying below the stomach, somewhat resembling a dog's tongue in appearance; the Pancreas (q.v.), esteemed as delicate and nutritious food. SWEET-BRIER or -BRIAR, a thorny shrub of the rose kind, having a sweet fragrant smell; the *Rosa rubiginōsă* (see ROSE). SWEET-FLAG (see ACORUS). SWEET-GUM, see LIQUIDAMBAR. SWEETHEART, a lover. SWEET HERBS, fragrant herbs cultivated for culinary purposes. SWEETMEATS, n. plu. confectionery articles made wholly or largely of sugar; fruit preserved with sugar. SWEET-MILK, milk as it is drawn from the cow, as opposed to skimmed and buttermilk. SWEET-OIL, olive-oil. SWEET-PEA, annual plant of the pea kind, whose flowers are beautiful and sweet-scented (see LATHYRUS). SWEET-POTATO, plant having tubers, much used for food (see BATATAS). SWEET-WILLIAM, flowering plant (see PINK). SWEET-WOOD: see CASCARILLA.—SYN. of 'sweet, a.': sugary; saccharine; dulcet; luscious; fragrant; pleasing; melodious; beautiful; bland; obliging.

SWEET SOP (*Anona squamosa*): fruit of the same genus with the Custard Apple (q.v.); produced by a small bush, with lanceolate leaves, native of warm parts of America, and much cultivated in Brazil, W. Indies, and generally in tropical countries. The fruit is greenish, and resembles an artichoke in size, in form, and in its scaly covering. The pulp is soft, somewhat mealy, sweet, and luscious, with musky aromatic odor and flavor. It is much used both in the E. and W. Indies, generally raw, sometimes cooked. Notwithstanding its foreign origin, it has proved the staff of life to the people of Hindustan in seasons of famine. The seeds are acrid, and the powder of them is used to destroy insect vermin.

SWELL, v. *swĕl* [Icel. *svella*, to swell: Dut. *zwellen*, to boil, to spring: Ger. *schwellen*, to heave]: to increase the size of; to expand or increase; to cause to increase or rise; to grow louder or larger; to dilate; to heave; to bulge out; to be inflated; to rise into arrogance or anger; to grow violent; to augment, as a note in music; to be puffed up: N. increase or enlargement of bulk; increase, as of sound; in *music*, the gradual increase and diminution in the sound of a note; in an *organ* (see below): a gradual elevation of land; a succession of large waves: in *familiar language*, a man of importance; a dressy foppish fellow, who apes a higher position than he actually occupies; a dandy: ADJ. pertaining to a dandy; foppish. SWELL'ING, imp.: ADJ. increasing; tumid; pompous; turgid, as style or language: N. act of enlarging or increasing in bulk; inflation; a tumor; any morbid enlargement; protuberance. SWELLED, pp. *swĕld*: ADJ. enlarged in bulk; also SWOLLEN, pp. *swōl n*. SWELL'ISH, a. characteristic of a swell; foppish. SWELL-MOB, a

company of well-dressed thieves following their calling, and acting in concert. SWELL-MOBSMAN, a member of the swell-mob. GROUND-SWELL: see under GROUND. ORGAN-SWELL, in an *organ*, a certain number of pipes inclosed in a frame, the gradual opening of which produces increased sound.

SWELL, in an Organ: group of pipes forming a separate department, which may have a separate key-board, and are capable of being increased or diminished in intensity of sound by action of a pedal or lever on a series of shades or shutters overlapping one another like Venetian window-blinds, within which the S. pipes are inclosed. On a well-constructed swell, a practiced performer can imitate not only a gradual *crescendo* and *diminuendo*, but also a *sforzando*, a very small opening sufficing to make an immediate burst on the ear: when the shutters are closed, an imitation of an echo may be produced.

SWELT, v. *swĕlt* [AS. *sweltan*, to die (see SWELTER)]: in *OE.*, to die; to faint; to swoon; to overpower, as with heat. SWEL'TING, imp. SWEL'TED, pp.

SWELTER, v. *swĕl'tĕr* [Goth. *swiltan;* Dan. *sulte*, to die: Icel. *svelta*, to famish (see SULTRY)]: to faint with heat; to suffer oppressive heat; to be ready to faint or perish from excessive heat. SWEL'TERING, imp.: ADJ. oppressed with heat SWEL'TERED, pp. *-tĕrd.* SWEL'TRY, a. *-trĭ*, oppressive by intense heat; sultry.

SWEPT, v. *swĕpt:* pt. pp. of SWEEP, which see.

SWERVE, v. *swĕrv* [expressing the notion of a hum or confused noise: Dut. *zwerven*, to wander, to revel: Sw. *swirra*, to whiz: Dan. *svirre*, to whirl round]: to wander from; to rove; to deviate, as from duty; to turn aside; to bend; to incline. SWERV'ING, imp.: N. act of wandering; deviation from any line, rule, or standard. SWERVED, pp. *swĕrvd.*

SWETCHINE (or SVETCHIN), *svĕch-ēn'*, ANNE SOPHIE (SOIMONOFF): 1782–1857, Sep. 10; b. Moscow. Her father, Soimonoff, was private sec. to Empress Catherine II., and she was brought up at court. She married Gen. S. 1799, and her home became one of the most celebrated salons in St. Petersburg. She embraced Rom. Catholicism 1815; and removing to Paris with her husband, passed the remainder of her life there and in Italy. She was the friend and correspondent of many of the leading French philosophers and authors of her time—e.g., Joseph de Maistre, Alexis de Tocqueville, Lacordaire, Lagrange, De Falloux. The last was her literary executor, and published her *Vie et Œuvres* (2 vols.); *Lettres* (2 vols.); *Lettres inédites.* Her correspondence with Lacordaire and with Lagrange has also been published.

SWIETENIA, n. *swē-tē'nĭ-a* [after Gerard Van *Swieten*, physician to Maria Theresa of Austria]: in *bot.*, the mahogany-tree: see MAHOGANY.

SWIFT, a. *swĭft* [the idea of rapidity is commonly expressed by the figure of a smart blow: Icel. *svipa*, to whip, to move quickly; *svif*, a sudden movement: Scot. *swipper*, quick, sudden: AS. *swifan* to move quickly]: moving a great distance in a short time; quick; nimble; speedy; ready; of short duration: N. a bird of the swallow tribe, so called from the rapidity of its flight (see below). SWIFT'-ER, n. *-ér*, among *seamen*, a rope used to confine the bars of the capstan in their sockets; a rope used to defend from external injury the sides of a boat; also, one of two shrouds not confined with the others. SWIFTLY, ad. *-lĭ*. SWIFT'NESS, n. *-nĕs*, rapid motion; quickness; expedition. SWIFT-FOOTED, a. nimble; fleet of foot.—SYN. of 'swift': fleet; rapid; expeditious.

SWIFT: bird of the family *Cypselidæ*, order *Picariæ*, having a close superficial resemblance in form and habits to swallows, which belong to another order, *Passeres*. In common with their order, the swifts differ from swallows in many points of skeleton, vocal apparatus, muscles, tarsal envelope, feet, etc. They are nearly related to the Goatsuckers, e.g., Whip-poor-will and Night-hawk. The typical swifts number more than 20 species of *Cypselus*, all old-world, and only one N. Amer. genus and species, the White-throated S. (*Panyptila saxatilis*) of the s.w. United States, black with white face and breast, and wings and tail with white markings, the species breeding in colonies on cliffs. The sub-family of spine-tailed swifts differs in having the normal number of phalanges. The N. Amer. species are the Black S. (*Nephœcetes niger*, var. *borealis*) of w. regions, nearly uniform blackish; and the Chimney S., miscalled Swallow (*Chætura Pelasgia*), sooty brown, below paler, throat gray, wings black, with the same instinct applied to chimneys that formerly led it to hollow trees, and not implying any intellectual progress, but rather a mistake often fatal to its young in the artificial abode. Another species, Vaux's S. (*C. Vauxii*), of the Pacific coast, is similar, but smaller and paler; length and wing 4½ inches.

Many of the S. group are often popularly called swallows, e.g., that which produces the edible nests of the E. Indies. In the genus *Cypselus*, as now restricted, the tail is generally forked, legs and toes feathered, and very small and weak, all the four toes directed forward. The birds of this genus pass most of their time in the air, and even copulate on the wing. The wings are longer than in any other bird; and the internal structure, even of the skeleton, is peculiarly adapted to prolonged flight. The anatomy resembles that of humming-birds more than that of true swallows.—The Common S. (*C. apus*) is common in almost all parts of n. Europe and of Asia in summer, retiring to tropical or subtropical regions in winter: it occurs even in Lapland. Its residence in its summer quarters is much shorter than that of swallows; and the S. is seldom seen with any of the swallows or martins—the different kinds choosing different localities, even though very close together The S. is easily recognized in its flight by the

remarkably sickle-shaped wings, and its slight scream is very different from the twitter of the swallow. It is black, with a white throat. It makes its nest in holes of rocks or of walls, often in those of houses. The nest is of bits of straw, dry blades of grass, and bents, feathers, and other such substances, apparently glued together by a mucous secretion. The S. builds sometimes in hollow trees. Swifts, like swallows, seem to return to the same place to make their nest, year after year, and repair the old nest, instead of making a new one.—The Alpine S., or White-bellied S. (*C. alpinus*), is common in s. Europe. It builds in high rocks, sometimes in steeples. It is larger than the Common S., and is the largest of Brit. *Cypselidæ*. Its wings are even longer in proportion than those of the Common Swift. Its voice is sweet—not a scream, like that of the Common Swift.

SWIFT, *swift*, JONATHAN: greatest of English, and perhaps of all, satirists, and the most original writer of his age: 1667, Nov. 30—1745, Oct. 19; b. Dublin, but of Yorkshire parentage. He was a posthumous child, reared in circumstances of poverty and dependence, whose recollection galled his proud irascible spirit, and embittered much of his life. He was supported by relatives, and educated at Kilkenny School and Trinity College, Dublin. As a student he was more intent on personal satires and political rhymes than academical honors; but he remained at college about seven years. He then removed to England, visited his mother in Leicestershire, and by her recommendation was admitted into the house of Sir William Temple, with whose family she had a distant connection. S. seems at first not to have conciliated the regard of the retired minister; but he remained with Temple, studying hard, till 1694, when he went to Ireland, took orders in the Established Church, and obtained a small living, which he resigned in two years, returning to England on summons from Temple, who missed his society and assistance. Temple died 1698, and S. in the following year published his posthumous works, after which he returned to Ireland, obtaining from Lord Berkeley some church preferments, including the vicarage of Laracor, worth in all about £400 per annum, which was all his professional income till he was appointed dean of St. Patrick's, Dublin, in his 46th year. Before this, he had written the wildest and wittiest and most powerful satirical work of the 18th c., *The Tale of a Tub* (1704), daring in invention, rich in humor, and crowded with suggestive thought—the work of a true genius: he wrote also a few essays on ecclesiastical subjects, some inimitable ridicule of astrology under the name of Isaac Bickerstaff, and poetical pieces in a peculiar vein of humor and description. In 1710, S., who was naturally a strong Church of England man and a sturdy opponent both of free-thinking and dissent, found his convictions diverging from the whigs—who also had seemed to neglect rewarding him for his political services; and he went over to the tories. He exerted himself strenuously in behalf of his new allies, Harley and Bolingbroke: he

wrote papers in *The Examiner* (1710); *Letter to the October Club* (1711); *The Conduct of the Allies* (1712); *The Barrier Treaty* (1712); and innumerable pasquinades against the whigs, whom he 'libelled all round.' He had become, by his trenchant, piquant, and satiric pen, a great and formidable power in the state, and was received as the familiar associate of the highest ministers of the crown; yet his own pride, with something of prejudice on the part of others due to his untamable satire as a writer, prevented his gaining higher preferment than the deanery of St. Patrick's. Powerful friends sought for him an appointment to the bishopric of Hereford; but some former victims of his satire used influences that prevented this promotion. His party was overthrown by the death of Queen Anne; and 1714 S. 'commenced Irishman for life,' with strong reluctance and disgust; though after a time he took interest in Irish affairs, and faithfully and conscientiously sought to accommodate himself to Irish feelings and prejudices. As a Prot. ecclesiastic among a Rom. Cath. people, Dean S. gained personal regard and popularity, but few converts. Hatred to Walpole and the English govt. quickened his political activity; and his resistance to Wood's copper coinage—a disgracefully corrupt scheme for supplying Ireland with copper money by an English patentee—raised him to the highest pinnacle of popular favor. His *Drapier Letters* (1724) produced such a ferment in Ireland that the govt. was compelled to abandon the scheme of the coinage. Two rewards of £300 each had been offered for the unmasking of the Drapier; but not a traitor, as he says, could be found in all Ireland to sell him. The triumphant author made his last visit to England 1726, and published his *Gulliver's Travels*, by far the most famous and universally popular of all his works. It is, in fact, the keenest of satires on statesmen and court life; but its bubbling fun, its strictly logical absurdity, its audacious paradoxes, and its undertone of truth to human nature, give mirthful delight to readers who do not recognize the objects of its satire. The last of its four parts, however, is overdrawn, and its unnatural strain is more vexatious than amusing. He next joined with Pope, Arbuthnot, and Gay in publishing three volumes of *Miscellanies*, after which he returned to Ireland (1727, Oct.), and never left it again. He was subject to fits of giddiness and deafness, which increased in frequency and intensity as he grew old; he brooded over the anticipated insanity which he foreboded as his future lot; his temper, always irritable and egotistic, became more violent and morose under cerebral disease, and his memory and other faculties gave way. There was also a deep and secret grief: the fate of two ladies, Esther Johnson and Esther Vanhomrigh (known as Stella and Vanessa), had been for years inseparably entwined with his own destiny; both had sacrificed for him all but honor, and both had sunk under disappointed hopes and blighted affection: Vanessa had died 1723, Stella 1728. We cannot here trace the painful story, which is involved in mystery; but for a time the retribution of S. was terrible. He seems

to have been incapable of the passion of love, though not without a certain solicitousness of tender affection; and though documentary evidence is lacking, there seems to be proof of his marriage to Stella 1716. On various trifling pretexts, he refused to acknowledge the marriage publicly. Yet, as is remarked by Thackeray, he everywhere half-consciously recognizes Stella as his better angel, and her declining health gave him the sincerest grief.—Some of his minor pieces were written in his later years—among them, *The Grand Question Debated; On Poetry, a Rhapsody; The Legion Club; Verses on the Death of Dr. Swift;* and that extraordinary prose tract *The Modest Proposal*, a masterpiece of irony, in which he proposes to relieve the distresses of the poor Irish by converting their children into food for the rich. The last three years of S.'s life were passed in almost total silence in the hands of keepers.

Among English authors, Shakespeare alone has received a greater amount of criticism and annotation. From Johnson to Thackeray, the most brilliant critics and biographers have employed themselves in elucidating his strange and sad history, and in estimating his writings. He is a tragic figure in literature: it is the saying of Thackeray, 'To think of him is like thinking of the ruin of a great empire.' As a consummate master of ridicule and irony, possessing great powers of wit, invention, illustration, and analogy; possessing also the dramatic faculty that enabled him to aasume and portray varieties of character; and as writing a pure, perspicuous English style, unsurpassed for strength and simplicity, Dean S. must ever be a model in our language and literature. His misanthropy, or degradation of human nature—his Yahoos (as in the last part of *Gulliver's Travels*), Strulbrugs, daring irreverence, and indelicacy—are utterly indefensible. He had a total incapacity, as De Quincey remarks, for 'dealing with the grandeurs of the human spirit, with religion, with poetry, or even with science, when it rose above the mercenary practical.' His literary concern was with the world—with the follies, vices, and absurdities of men.—His poetry was not equal to his prose; it lacks passion, elevated feeling, and imagination. His complete works were edited by Sir W. Scott (19 vols. 1814). See Life by John Forster (I. 1875, unfinished); by Leslie Stephen (1882); and by H. Craik (1883): the last ranks as the standard work on the subject.

SWIFT, *swift*, JOSEPH GARDNER, LL.D.: 1783, Dec. 31 —1865, July 23; b. Nantucket, Mass.: civil engineer. He was the first graduate at the U. S. Milit. Acad., 1802; entered the army as 2d lieut. of engineers the same year; was promoted capt. 1806, maj. 1808, and lieut.col., col., and chief engineer 1812; planned the defenses of New York Harbor 1812–3, and was chief engineer of the army on the St. Lawrence river 1813; brevetted brig.gen. 1814; supt. U. S. Milit. Acad. 1816–7; U. S. surveyor of the port of New York 1818–27; and supt. of harbor improvements on the lakes 1829–45. In 1841 he was a peace commissioner to the Canadian provinces.

SWIFT, LEWIS, PH.D.: astronomer: b. Clarkson, N. Y., 1820, Feb. 29, where he received his only schooling. Educating himself in the sciences, he was an itinerant lecturer on magnetism, electricity, and microscopy. Removing to Rochester, N. Y., 1872, he made original observations with a telescope constructed by himself, and received the gold medal of the Vienna Acad. of Sciences for discovery of comets. Hulbert H. Warner built for him the Warner Observatory and residence, citizens contributing to the new telescope. For this, Prof. Swift invented important mechanical improvements, and previously invented an oxy-hydrogen microscope, etc. For his work on the comet of 1880, he was awarded a prize by the French Acad. He has discovered many nebulæ, and the 8-tailed comet of '92.

SWIFT, WILLIAM HENRY: engineer: 1800, Nov. 6—1879, Apr. 7; b. Taunton, Mass.; brother of Joseph Gardner S. He graduated at the U. S. Milit. Acad. 1819; served with Long's Rocky Mountain expedition till 1821; was on topographical duty in making various surveys 1821–32; was brevetted capt. and appointed asst. topographical engineer 1832; and was promoted full capt. 1838. In 1843–49 he was asst. to the chief of topographical engineers; 1847–49 designed and built the first Minot's Ledge light-house; 1849 resigned from the army; and afterward was pres. of various railroads.

SWIG, v. *swĭg* [Dut. *zwelgen*, to devour, consume (see SWALLOW): comp. also *swill*]: to drink a large draught in sounding gulps; to suck greedily: N. a large draught. SWIG'GING, imp. SWIGGED, pp. *swĭgd.*

SWILL, v. *swĭl* [AS. *swilian*, to wash. Icel. *skyla;* Dan *skylle*, to rinse, to wash]: to rinse; to wash out with water; to drink greedily; in *OE.*, to drench; to be intoxicated: N. the mixture of liquid substances given to swine, also called SWILL'INGS, *-lĭngz;* drink taken in excessive quantities. SWILL'ING, imp.: ADJ. drinking grossly; in *OE.*, intoxicating; drenching. SWILLED, pp. *swĭld.* SWILL'ER, n. *-ẽr*, one who swills or drinks heavily.

SWILLY, LOUGH, *lŏch swĭl'ĭ:* inlet of the Atlantic, on the n. coast of Ireland, county of Donegal, entering between Dunaff Head on the e. and Fanad Point, on which there is a light-house, on the w. It penetrates the country in an irregular but generally s. direction, is about 25 m. long, and at its entrance, where it is widest, 3¾ m. wide. On the e. shore is the small town Buncrana, a resort for sea-bathing, in front of which is a roadstead capable of accommodating the largest men-of-war.

SWIM, v. *swĭm* [originally applied to the movement of water in agitation: Icel. *svamla*, to splash, to paddle in water; *svimma*, to swim: Ger. *schwemmen*, to bathe in water, to float; *schwimmen*, to swim: Sw. *svimma*, to be dizzy]: to move about on the surface of water by movements of the hands and legs; to move through water by means of fins, as fish; to be carried along on the surface of water; to float on water; to cause to swim; not to sink; to pass over by swimming, as a river; to have a waving

feeling in the head, when the visible scene appears in unsteady movement like the surface of water; to be dizzy: N. a movement on the surface of water; the air-bladder of a fish which supports it in water. SWIM'MING, imp.: ADJ. floating on a fluid; moving in or on water: N. the act or art of propelling the body through water by movements of the hands and feet (see SWIMMING AND DIVING); a floating: dizziness. SWAM, or SWUM, pt. *swăm* or *swŭm*, did swim. SWUM, pp. *swŭm*. SWIM'MINGLY, ad. *-lĭ*, in *familiar language*, smoothly; without obstruction; with great success. SWIM'MER, n. *-mĕr*, one who or that which swims; a protuberance on a horse's leg; a water-fowl. SWIM'MERETS, n. *-ĕts*, limbs of crustacea adapted for swimming. To SWIM WITH THE STREAM, to go with popular opinion.

SWIMMING AND DIVING: arts of propelling the body in water and of plunging head-foremost into water. The first lesson for the mind of the beginner is that the living human body is specifically lighter than water, and therefore does not necessarily sink therein. The easiest way of convincing the pupil of the buoyancy of the body is by having him lie on the back (slightly hollowed), with arms stretched out beyond the head, but not lifted out of water: this attitude makes respiration easy and counterbalances the weight of the legs. The knees may be bent outward and the hips should be rigid, thus helping to keep the legs as close as possible to the surface. As in learning to float, so in learning the use of the arms and legs in swimming, perfect self-possession is indispensable. All hurry and excitement must be avoided, and every complete stroke and kick performed with precision. The only part requiring strong muscular exertion is the closing of the legs after they have been spread apart: every effort is to be made to insure correctness and power in this act. The arm movements should be easy and graceful, jerkiness being avoided.

The movement known as *treading* is of great importance: if persons unable to swim when accidentally immersed, would practice treading, they could in very many instances sustain themselves in the water for a considerable time, or until the arrival of help. In treading, the hands and arms are to be kept under the surface, while the body stands perpendicular. The hands are to make a motion precisely like that made by a dog's paws, but never above water, never splashing; at the same time the feet strike down, always slowly, gracefully; the head to lean backward, keeping mouth and nostrils out of water.

The most famous performances in swimming in recent times are the following:

Distance.	Swimmer.	Time, h. m. s.
80 miles	Capt. Webb	.....
40 "	Capt. Webb	9 57 0
20 "	F. Cavill	5 51 0
20 "	Agnes Beckwith	6 25 0
3 "	J. Finney	1 26 30
2 "	T. E. Kitchling	54 57¾
1 "	A. Meffert	12 0½
1,000 yds.	J. Nuttall	14 17¼
880 "	E. Dunsman	5 1½

In DIVING, the performer, before making his leap, holds feet and legs together, with chest inflated; body and legs bent toward the water. The lungs are charged, and the dive is made immediately before the arms and hands are raised forward into the air above the bent head. The feet are used with all the power possible in springing off. When in mid-air the diver straightens himself out from finger-tips to toes. The shoot downward is made by declining the arms so as to inclose the head, the chest is momentarily contracted, and the water is entered, fingers first. A skilled diver does not descend more than 3–4 ft., but a clumsy performer will descend 7–8 feet.

SWINBURNE, *swĭn'bĕrn*, ALGERNON CHARLES: one of the first of living English poets: b. London, 1837, Apr. 5; son of Admiral Charles Henry S., by Lady Jane Henrietta, daughter of the third Earl of Ashburnham. He entered as a commoner at Balliol College, Oxford, 1857, but left the univ. without graduating. His first literary venture (1861), a volume containing two plays *The Queen Mother* and *Rosamund*, attracted little attention; but *Atalanta in Calydon*, tragedy (1865), at once established his reputation. Afterward came *Chastelard*, tragedy (1865); *Poems and Ballads* (1866); *A Song of Italy* (1867), *Siena* (1868); *Songs before Sunrise* (1871); *Bothwell*, tragedy (1874); *Erechtheus* (1875); and a new series of *Poems and Ballads* (1878). S. belongs to what has been aptly called the 'fleshly school' of poetry, and even those who most admire his power of poetical expression, marvellous felicity in musical versification, richness of coloring, and happy lyrical effects, deplore the sensuous tone of his muse. He has also been severely criticised for the wanton violence with which he attacks the most sacred beliefs. His other publications include: *Essays and Studies* (1875); *Note on Charlotte Brontë* (1877); *A Study of Shakespeare* (1879); *Songs of the Springtides* (1880); *Studies in Song* (1881); *Mary Stuart, a Tragedy* (1881), which, in connection with *Chastelard* and *Bothwell*, completes a dramatic trilogy; *Tristram of Lyonesse, and Other Poems* (1882); *A Century of Roundels* (1883); *Marino Faliero: a Tragedy* (1885); *Prose Miscellanies*, and *The Life of Victor Hugo* (1886); *The Armada* (1888); *A Study of Ben Jonson*, and *An Autumn Vision* (1890).

SWINDLE, v. *swĭn'dl* [Ger. *schwindel*, swimming in the head—applied to dealings in which the parties seem to have lost their head; *schwindler*, a cheat, a swindler. Dan. *svimle*, to be dizzy (see SWIM)]: to cheat grossly under the pretense of fair dealing; to defraud with deliberate artifice: N. a fraud or imposition; a design to cheat people out of money. SWIN'DLING, imp. *-dlĭng:* ADJ. cheating; defrauding: N. act of grossly cheating; knavery. SWINDLED, pp. *swĭn'dld*, grossly cheated. SWIN'DLER, n. *-dlĕr*, a cheat; one who makes it a practice to cheat others; a sharper; a rogue.

SWINDON, *swin'don:* old market-town of Wilts, England; about 77 m. w. of London, on an eminence commanding fine views. There is a large corn-exchange. A mile n. of the town is Swindon Junction, the great central establishment of the Great Western railway; and a large town has risen around the station, called the New Town, consisting mainly of dwellings for the employés of the railway. S. has a large and beautiful church, a public park, library, and mechanics' institution. Pop. of S., Old Town (1891) 5,545; New Town, 27,295.

SWINE, n. sing. or plu. *swīn* [Goth. *svein;* Pol. *swinia*, swine: Ger. *schwein;* AS. *swīn;* L. *sus*, a sow]: a pig; a sow; pigs collectively (see HOG). SWINISH, a. *swī'nish*, resembling a sow; gross; hoggish. SWI'NISHLY, ad. *-li*. SWI'NISHNESS, n. *-nĕs*, the state or quality of being swinish. SWINEHERD, a keeper of swine. SWINESTONE, the fetid varieties of limestone, better known as *stinkstone*. SWINE-STY, a pen or house for swine.

SWINEMÜNDE, *swē'neh-mün'deh:* maritime and fortified town of Prussia, province of Pommern; 35 m. n.w. of Stettin, on the island of Usedom, at the entrance of the narrow channel of Swine, which connects the Grosses Haff (into which the Oder flows) with the Baltic. S., as in some sense the port of Stettin (q.v.), has considerable commerce, also valuable fisheries; but it is noted chiefly for its excellent sea-bathing. The light-house of S. has a tower 200 ft. high.—Pop. (1880) 8,478; (1890) 8,508.

SWINE-PLAGUE: infectious disease attacking swine. It was long supposed to be identical with the anthrax diseases which are known under the general name of hog-cholera and which, in some respects, it closely resembles; but investigations in recent years, under direction of the U. S. dept. of agriculture, have shown it a distinct malady. The bacteria which cause the S.-P. are quite different from and less vigorous than those which cause hog-cholera. The S.-P. affects primarily the lungs and secondarily the intestines, but the hog-cholera manifests itself first in the digestive organs and afterward involves the lungs. Attacks of S.-P. vary greatly in severity. In some outbreaks the disease is very malignant, spreads rapidly, and causes enormous losses; in others it appears in milder form. The bacteria of S.-P. and of hog-cholera are sometimes present in the same animal, causing a complication of diseases. In such cases the distinctive form of the attack depends on the relative vigor of the two classes of bacteria. Among the prominent symptoms of S.-P. are coughing, loss of appetite, and rapid emaciation. The disease appears over large areas and under widely different climatic conditions. In this country it is by far the most prevalent in the great hog-growing states of the west. It is spread by contact and by the infection of the soil and pens where diseased animals have been kept. Treatment is usually of little avail; and as the few animals which survive an attack seldom thrive, and as for some time they are liable to communicate the disease to healthy stock, it appears best, on the

appearance of the disease, to destroy the entire herd immediately. The carcasses of such animals should be burned or deeply buried; the feeding-troughs, yards, and pens thoroughly disinfected by the use of carbolic acid or some equally powerful substance; and for several months after an outbreak no swine should be allowed on an infected field. If an effort is made to save any of the stock from a herd in which the disease has appeared, the healthy animals should be promptly taken to new quarters, kept on a light diet, and given the best of care. But preventive measures are far more satisfactory in results than efforts for cure. They consist in careful breeding with a view to securing strong constitutions, preventing contact with diseased animals and with all other sources of infection, supplying good food of various kinds, providing plenty of room and clean surroundings, and giving attention to all hygienic conditions. Many experiments have been made to test the value of inoculation as a preventive of the S.-P., but thus far the results seem uncertain, and the method is open to the grave objection of carrying the germs of the disease to new localities.

SWING, v. *swĭng* [Ger. *schwingen;* Dan. *svinge,* to whirl, to brandish: AS. *swingan,* to scourge, to beat]: to cause to wave or vibrate; to wave loosely; to vibrate; to oscillate; to whirl round; to move to and fro, as the arms in walking; to brandish; to flourish; to change position at anchor, as a ship at each turn of the tide; *colloquially,* to be hanged: N. motion from one side to the other; a waving motion; an apparatus to swing in or from; unrestrained liberty or license; the sweep of a moving body; bent; the influence or power of a body put in motion. SWING'ING, imp.: ADJ. moving to and fro; waving; brandishing; great; huge: N. act of moving to and fro. SWANG, or SWUNG, pt. *swăng* or *swŭng,* did swing. SWUNG, pp. *swŭng.* SWING'ER, n. *-ĕr,* one who swings. SWING'INGLY, ad. *-ĭng-lĭ,* in a swinging manner; vastly; greatly. SWING-BRIDGE, a bridge that may be moved by swinging, to admit the passage of vessels. SWING-PLOW, a plow without a forewheel under the beam. SWING-TREE, the bar of a carriage to which the traces are fastened; also SWINGLE-TREE. SWING-TREES, three cross-bars of a plow, consisting of the long or master tree hooked to the bridle of the plow, and the two short trees in front, each hooked to an end of the master tree. SWING-WHEEL, in a *timepiece,* the wheel which drives the pendulum. SWING-SWANG, *familiarly,* an alternate movement, one up and one down. IN FULL SWING, at its height, as an entertainment; enjoying free course.

SWING, *swĭng:* cognomen assumed by senders of threatening letters during the period in England when the irritation of the agricultural laborers against their employers was at its height, 1830–33. The laborers believed that the use of machinery would lessen the demand for labor, and reduce wages; and their irritation was intensified by cruel severity in enforcing the game-laws. As inattention of employers to the demands in these threaten-

ing letters was followed by the burning of their stacks, farm-buildings, etc., the dictates of 'Captain Swing' were in many places obeyed; and the abuse became intolerable. Then the law was applied; and the punishment of the offenders ended the outrage.

SWING, *swing*, DAVID, D.D.: undenominational pastor: b. Cincinnati, O., 1830, Aug. 23. He graduated at Miami Univ., O., 1852, and was prof. there 12 years, preaching on occasion. The Fourth Presb. Church of Chicago, of which he became minister 1866, was burned in the great conflagration 1871, after which his congregation had services in hall or theatre until a new church edifice was built 1874. In that year he was tried for heresy, on charges made by Prof. Francis L. Patton, but was exonerated. Since then, he and his large congregation have preferred freedom from denominational associations, and have worshipped in the large Central Music Hall. Several volumes of his discourses have been published, entitled *Truths of To-day* and *Motives of Life;* he was also a contributor (1890) to *The Beginning and the End*, or comments on the life of Christ by various authors. As a preacher he attached to himself a great congregation: he was broad, practical, literary, with a prevading spirit of geniality; but his published discourses do not sustain fully the reputation acquired by his living voice. D. 1894, Oct. 3, in Chicago

SWINGE, v. *swinj* [see SWING: AS. *swingan*, to do something with violent action: Ger. *schwinge*, a swingle: Dut. *zwingelen*, to swingle flax]: to beat soundly; to whip; in *OE.*, to move, as a lash: N. in *OE.*, sweep or swing of anything in motion. SWINGEING, imp. *swin'jing*. SWINGED, pp. *swinjd*. SWINGED-BUCKLERS, in *OE.*, same as SWASHBUCKLERS, which see under SWASH. SWINGEL, n. *swing'gl*, that part of a flail which falls on the grain in thrashing. SWINGLE, v. *swing'gl*, to beat; to clean or dress by beating, as flax; to swing or dangle: N. in *wire-works*, a wooden spoke fixed to the barrel that draws the wire; a crank; also, same as SWINGEL. SWIN'GLING, imp. *-gling*. SWINGLED, pp. *swing'gld*. SWINGLE-TREE, the cross-bar of a carriage, plow, etc., to which the traces of a harnessed horse are fastened; a whiffle tree. SWINGLE-TOW, the coarse part of flax separated from the finer.

SWINISH, SWINISHNESS: see under SWINE.

SWINK, v. *swingk* [AS. *swincan*, to toil, to labor: Ger. *schwanken*, to vibrate, to shake: Low Ger. *swunken*, to sway to and fro]: in *OE.*, to toil; to drudge; to labor: N. in *OE.*, labor; toil; drudgery. SWINK'ING, imp. SWINKED, or SWINKT, pp. *swingkt:* ADJ. in *OE.*, tired with work; overworked. SWINK'ER, n. *-er*, in *OE.*, a laborer.

SWINTON, *swin'ton*, JOHN: journalist: b. Salton, Scotland, 1830, Dec. 12. Having come to America 1843, he learned the printer's trade, and was for a few years journeyman printer. Then he received a literary education in Williston Seminary, Easthampton, Mass. He was an active partizan of the free-state cause in Kansas 1856; began the study of medicine in New York 1857, at the same time

contributing articles to the N. Y. *Times*, of which he was later managing editor; afterward he was for some years managing editor of the N. Y. *Sun*. He published and edited a weekly newspaper 1883–87 in the interest of social reform. He died 1901, Dec. 15.

SWIN'TON, WILLIAM: author: b. Salton, Scotland, 1833, Apr. 23; bro. of John S. He came to this country; was educated at Amherst Coll.; was prof. of languages in a girls' seminary at Greensborough, N. C., 1853–4; then was prof. in Mt. Washington Collegiate Institute, New York. He joined the editorial staff of the N. Y. *Times* 1858; and 1862 went as correspondent to the seat of war. Gen. Burnside ordered his exclusion from the army lines 1864, because of his criticisms of certain tactical movements; S. incurred the displeasure of Gen. Grant for like reasons. He was prof. of belles-lettres in the Univ. of Cal. 1869–74. By his private studies, his observations in the field, and his later researches, he fitted himself to be a historian of the secession war, and wrote several volumes on different military operations. He is author of a series of school text-books covering nearly all the branches studied in common schools. To S. was awarded at the Paris World's Fair of 1867 a gold medal 'for educational works of remarkable originality and value.' Died 1892, Oct. 25.

SWIPE, n. *swīp* [another form of *swape:* Icel. *svipa*, to move rapidly to and fro]: a contrivance for drawing water, consisting of a rod unevenly balanced on a post, having a weight at the short end and a bucket at the long end.

SWIPE, v. *swīp* [Norw. *skvip*, thin and tasteless drink: Ger. *schwappen*, to splash: prov. Dan. *svip*, thin beer]: in *prov. Eng.*, to drink off hastily. SWIPES, n. *swīps*, a kind of weak or small beer.

SWIPE, v. *swīp* [see SWEEP]: to deliver a strong blow: N. a sweeping blow.

SWIRL, v. *swėrl* [Norw. *svirla;* Dan. *svirre*, to whirl]: to rush along in eddies; to form eddies.

SWISH, v. *swĭsh* [see SWITCH]: to lash; to switch.

SWISS, n. *swĭs:* a native of *Switzerland;* the language. SWITZER, n. *swĭt'sėr*, a native of Switzerland.

SWISS GUARDS: Swiss soldiers formerly hired by many European sovereigns for personal body-guards and for special services about courts. They were common in France 1616 to 1830, and were distinguished for bravery and devotion to the interests of those whom they served. The usage of Swiss citizens hiring themselves out for foreign military service has been entirely discontinued, except that the pope still maintains such a body at the Vatican, whose duties are more ceremonial than protective.

SWISSHELM, *swĭss'hĕlm*, JANE GREY (CANNON): political agitator: 1815, Sep. 6—1884, July 22; b. near Pittsburgh, Penn. She earned livelihood from the age of 8 till 21 by manual labor and teaching. Marrying James S. 1836, she settled in Louisville, Ky., and was soon known as a resolute opponent of slavery. Her first appearance in print

in this character was in the Louisville *Journal*, 1842. She was a regular contributor to the Pittsburgh *Spirit of Liberty*, an organ of abolition and woman's rights. She founded a similar journal, the Pittsburgh *Saturday Visitor*, 1848, which was merged in the weekly ed. of the Pittsburgh *Journal*, 1856. The next year she established at St. Cloud, Minn., another *Visitor*. A mob sacked her office and threw her press into the river. Then she started the St. Cloud *Democrat*, and in the presidential canvass of 1860 championed the republican party effectively with voice and pen. She was one of the first women to go to the front as an army nurse in the war; and her service was as good as her zeal was great. Besides her contributions to newspapers and magazines, Mrs. S. was author of *Letters to Country Girls* (1853), and an autobiographical work, *Half of a Century* (1881).

SWITCH, n. *swĭch* [imitative of the noise made by it in moving rapidly through the air. O. Dut. *swick*, a scourge or whip: prov. Ger. *swutsche*, a long thin rod: Icel. *svigi*, *sveigr*, a switch]: a thin flexible branch of a tree; a twig; on the *permanent way of a railway*, a movable part of a rail for the purpose of transferring a carriage from one line or track to another; a device in telegraphy by which one circuit can be connected with another: V. to strike with a flexible rod or twig. SWITCH'ING, imp.: N. a beating with a switch. SWITCHED, pp. *swĭcht*.

SWITHUN, *swĭth'ŭn* (or SWITHIN *-ĭn*), SAINT: English ecclesiastic of the 9th c., chaplain to King Egbert, and tutor to his son Ethelwulf: d. 862. When Ethelwulf came to the throne, S. held the office of chancellor. He had charge of the education of King Alfred, whom he is said to have accompanied to Rome 856. In 852 he was consecrated bp. of Winchester. The accounts of him are almost wholly legendary. According to William of Malmesbury, he was 'a rich treasure of all virtues, and those in which he took most delight were humility and charity to the poor.' He adds that he built several churches, and travelled through his diocese with his clergy on foot, and often at night, to avoid ostentation. The origin of the tribute called 'Peter Pence' (q.v.) has been often assigned to S. St. S. was buried, according to his own orders, not in the church but in the church-yard of Winchester. A century later, he was canonized; and (according to one of the many legends that have gathered about this saint) the monks who had exhumed his body, to deposit it in Winchester Cathedral July 15, were delayed by violent rains without intermission for 40 days; whence arose the still current belief that if rain fall on St. S.'s day it will continue 40 days. Usually when wet weather sets in about the summer solstice, it proves of considerable duration; and a similar superstition is popularly attached to the festivals of various saints at about the same period. In France, the watery saints' days are those of St. Médard (June 8), and St. Gervais and St. Protais (June 19); the rainy saint in Flanders is St. Godeliève; and in Germany there are three saints' days to which this belief attaches.

SWITZER: see under SWISS.

SWITZERLAND, *swit'zer-land* (Ger. *Schweiz;* Fr. *Suisse;* It. *Svizzera*): inland country of Europe, between 45° 48′—47° 49′ n. lat., and 5° 55′—10° 30′ e. long.; greatest length e. to w. 180 m., greatest width 130 m., 15,964 sq. m. Of this area, about 710 sq. m. are occupied by glaciers, and about 520 sq. m. by lakes.

Population.—Pop. (1870) 2,669,147; (1880) 2,846,102; (1900) 3,315,443. The following table gives the area and pop. of cantons by census 1888 and 1900:

CANTONS.	Sq. Miles.	Pop. 1888.	Pop. 1900
Zürich	665	339,014	431,036
Bern	2,657	539,271	589,433
Lucerne	579	135,780	146,159
Uri	415	17,284	19,700
Schwyz	351	50,396	55,385
Unterwalden (Upper)	183	15,032	15,260
" (Lower)	112	12,524	13,070
Glarus	267	33,800	33,349
Zug	92	23,120	25,993
Freiburg	644	119,562	127,951
Soleure	302	85,720	100,762
Basel (Town)	14	74,251	112,227
" (District	163	62,123	68,497
Schaffhausen	114	37,879	41,514
Appenzell (Exterior)	101	54,200	55,281
" (Interior)	61	12,906	13,499
St. Gall	779	229,141	250,285
Grisons	2,773	96,291	104,520
Aargau	542	193,828	206,498
Thurgau	381	105,091	113,221
Tessin, or Ticino	1,088	127,274	138,658
Vaud	1,244	251,288	281,379
Valais	2,027	101,925	114,438
Neufchatel	312	109,047	126,279
Geneva	108	107,000	132,609
Total	15,976	2,934,057	3,315,443

Surface.—S. is the most mountainous country of Europe. Its principal chains are the Alps (q.v.) and the Jura (q.v.). The Alps run from e. to w. along its s. or Italian frontier. Their ramifications fill more than one-half of the country, and terminate along a line which may be traced from Vevey, on the Lake of Geneva, to Mt. Moleson and Mt. Napf, across Lake Zug, to the s. shores of the lakes of Zürich and Wallenstadt, and Sargans on the Rhine. The mean elevation of the highest chain is 8 000 to 9,000 ft. The Jura run n.e. from the w. corner of S.; they consist of a series of parallel ridges inclosing long and narrow valleys, and their mean elevation does not exceed 4,000 ft. In the angle formed between them and the Alps lies the plain of S., a tableland 100 m. long and 20 to 30 m. wide, with mean elevation about 1,400 ft. above the sea. It is not absolutely level, but covered with elevations, which seem unimportant when contrasted with the huge masses of the Alps and Jura. It has been aptly described as a corner of s. Germany, penetrating like a wedge between France and Italy. The communication between the plain of S. and the German valleys of the Danube and

Rhine is not, however, continuous. The plain on the e. terminates in a third hilly tract—the Thur hill-country, between the lakes of Zürich and Constance, and to some extent at least, forming a barrier between the plain of S. and Germany. Jura, the plain, and the hill-country are thus the great divisions of n. Switzerland. The divisions of the Alpine region are more strongly marked in nature. A glance at the map will show that the chains which overspread it radiate from a mountain knot w. of the Grimsel Pass. They isolate and inclose (1) the valleys drained by the Rhone, which connect S. with s. France; (2) Ticino, drained by streams which descend to the Po, and have at all times brought this country into close communication with Italy; (3) The Grisons, the most sequestered valleys of S., drained by the tributaries of the Rhine and Danube, and shut out by mountains from the lower basins of these rivers; (4) The Bernese Oberland, which slopes toward the w. extremity of the Swiss plain; (5) The district of the Forest Cantons—Schwyz, Uri, and Unterwalden—surrounding the Lake of Lucerne, and which slope toward the e. extremity of the plain, and seem a great mountain fortress erected in the very heart of S., to protect the plain from German invasion.

Geology is of little importance in explaining the general geography of S. In the s. Alpine region, the rocks are crystalline; in the n. Alpine region, they belong to the Jurassic and Upper Secondary strata; in the plain and a great part of the hill-country, they consist of loose Tertiary sands and clays, which supply the best agricultural soils of S. Those rocks and formations in which mines and coal chiefly abound are absent.

Climate.—The climate varies chiefly with elevation above sea-level. Above 9,500 ft., the mountains are covered with perpetual snow, which descends along the hollows in Glaciers (q.v.) to a much lower level, and in this way covers the elevated part of the country with a vast sea of ice. Below the level of perpetual snow, the surface of S. has been divided into a series of belts, characterized by different climates and productions. The highest belt, between the snow and the level of 6,900 ft., has been called the Upper Alpine region: in it, the glaciers fill the valleys, but plants clothe the scanty soil of the ridges. The second or Lower Alpine belt descends to 4,800 ft.: it is a country of pastures, in which shrubs but no trees make their appearance. The Righi Pass, the Grimsel Hospice, and the Splügen are included in it. The third belt descends to 4,350 ft.: the meadows still abound in it, but forests of firs and maples in many parts replace them. It includes Urfenthal and Oberengadin. The fourth belt sinks to 3,000 ft.: the forests still abound, the beech being the prevailing tree the meadows are excellent, and rye and barley are successfully cultivated. It includes Weissenstein, Grindelwald, and Engelsberg. The fifth belt lies above 1,800 ft.: in it the oak and walnut are the characteristic forest trees: spelt and the best wheat are cultivated. It includes Bern, Coire, and St. Gall. The last belt sinks to 750 ft,: in it

the chestnut is the characteristic tree; the mulberry and the vine are extensively cultivated, and wheat is the grain chiefly grown. This belt includes the greater part of the Swiss plain, and sinks to its lowest level in the Valley of the Rhine, between Constance and Basel, and the banks of Lake Zürich and the Lago Maggiore. In this last district, the vegetation is that of n. Italy. At a higher elevation than 6,400 ft., S. is inhabited only by herdsmen during the summer months: at this limit, however, permanent abodes begin to make their appearance; and at 4,000 ft. there are many villages. The most populous part of S. is between 1,250 and 2,150 ft.; the temperature of this region is fairly represented by that of Zürich. The temperature of Zürich is in winter 30·34°; in spring, 47·25°; in summer, 64·15°: in autumn, 49·05°: for the year, 47·95°. The temperature of London is in winter, 38·22°; in spring, 48·34; in summer, 61·74°; in autumn, 50·29°: for the year, 50·50°.

Productions.—In S., where good coal is not to be had, and where the houses are of wood, the forests, which cover one-sixth of the whole surface, acquire very great importance. Wood-cutting is one of the chief employments. The trees cut down in the highlands are deprived of their branches, and shot with inconceivable rapidity over the slopes to the valleys below, whence they are removed by rafts to different parts of S., and to France and Germany. It is, however, the mountain-pastures and the meadows, forming two-fifths of the whole surface of the country, that supply the most important occupations of the people —those of herdsmen and shepherds. During summer, the cattle are driven into the mountains, and tended by herdsmen, who take up their abode in the rude wooden huts known as *châlets*, and there the butter and cheese are made. In summer, it is estimated that there are in S. more than a million of horned cattle, one-fourth of which are milk cows. The produce of the dairy annually is valued at 5 to 10 millions dollars. The best breeds of cattle are those of Saanen and Simmenthal in Bern, Gruyères in Freiburg, Schwyz, Zug, Entlebuch, Pralligau in the Grisons, and Glarus. The best cheese is made at Emmen, Saanen, Simmenthal, Gruyères, and Ursern. The sheep of S. are of inferior breed, and their wool is short and coarse; but the goats are numerous and fine. More than two-thirds of S. does not supply corn enough to feed its inhabitants. The plain, however, is a fertile agricultural country. In Vaud and Neufchatel, cultivation of the vine is the chief occupation; and in the Thur hill-country, particularly on the shores of the Lake of Constance, are extensive orchards, in which are prepared cider and *kirschwasser*, the latter a liquor largely consumed in S. Out of every 100 sq. m. of surface, 30 are occupied by rocks, glaciers, and water; 20 by hill-pastures; 17 by forests; 11 by arable lands; 20 by meadows; and 1 by vineyards. In the uncultivated part of the country, the bear, the wolf, and the larger birds of prey are still found; and the Chamois

(q.v.) is hunted. The rivers and lakes abound with fine fish, especially trout.

Finances.—In 1889 the govt. receipts were $13,114,340; expenditures $12,887,121; debt (1890, Jan. 1) $11,804,727; receipts 1900, $20,206,743; expenditures, $20,551,567; debt (1902), $13,600,000. Each canton has its own budget of revenue and expenditure and its own debt, all independent of the federal finances.

Manufactures.—The manufacturing districts are not scattered over the whole country; but are mostly on the n. frontier. The chief manufactures are: at Zürich, silk-stuffs, to the value of $8,000,000 annually, and cottons; at St. Gall and Appenzell, cottons; in Aargau and Glarus, cottons, linens, silks, and hosiery; at Basel, silk-stuffs to the value of $7,000,000, leather, paper, and tobacco; in Aargau and Lucerne, straw-plaiting; in Neufchatel, watch-making and cotton-printing; in Geneva, watch-making and jewelry.

Commerce.—Although S. is inland, its commerce in proportion to population has long exceeded that of any other continental country. In 1900 the special imports aggregated $174,000,000, and the exports $231,000,000. The chief imports in order were food, including wine and spirits, silk, precious metals, cotton, wool, cattle, minerals, excluding metals; iron, chemicals, and clothing: chief exports were silk goods, cotton goods, watches, clocks, and component parts, food, including wine and spirits, and precious metals. Exports to the United States were (1902-03) $21,183,378; imports $205,647.

Railroads, Telegraph and Post-office.—In 1901 there were 2,490 m. of railroad, which by law of 1898 have become state property. The telegraph system comprised 4,095 m. of state line, 1,477 of railway and private line and 230 of cable, etc., lines—total 5,512 m.; dispatches handled 3,914,994. There were 19,875 m. of telephone lines. The post-office handled 102,223,725 letters and 43,432,285 postal cards, 12,132,631 domestic and foreign newspapers and samples, and 1,630,026 parcels. Internal communication has long been facilitated in S. by excellent roads, and every advantage has been taken of the lakes to introduce steam-navigation.

Government.—Hitherto, the Swiss have been much separated into distinct communities by the great mountain-chains which separate the cantons. One of the results has been the weakness of the central power. Each valley has been intrusted with making its own laws, and the management of its own local affairs. The cantons are, in fact, to this day in a great measure separate states. They are divided into two classes, absolute democracies and representative democracies. In the former, the chief power belongs to the *Landesgemeinde*, an assembly of the whole adult male population, which meets once a year, to pass laws, and to regulate the taxes and expenditure of the canton. Uri, the Unterwaldens, Appenzell, and Glarus have constitutions of this kind. In the Grisons and the Valais, the people may be said to possess similar powers, as

all measures must be approved by them. In the other, the representative cantons, a great council is elected by the people, and to it are deputed most of the powers of the Landesgemeinde. These local assemblies produce a remarkable effect on the Swiss people. Their debates have an importance beyond that of a colonial parliament, for their power is much greater, and the population are more immediately interested in them. To the interest that they excite may be attributed in a great degree the intelligence and public spirit of the Swiss. Their greatest disadvantage lay in the power that the cantons formerly had to levy war against each other, and to resist the general government in conducting the foreign policy of the country. But these defects were to a great extent remedied by the constitution of 1848, which forms the basis of the present constitution, dating from 1874. It handed over the control of the army, the conduct of foreign affairs, the settlement of disputes between the cantons, and the management of the police and post-office, to a federal assembly (*Bundes Versammlung*) representing all the cantons. How far this assembly is entitled to interfere with the legislative action of the cantons has not been distinctly defined; but the tendency of legislation since its formation has been somewhat to trench on their prerogatives. The federal assembly consists of two chambers—1st, the State Council (*Stände Rath*); 2d, the National Council (*National Rath*). The former is composed of 44 members, 2 representing each canton, elected for 3 years by the cantonal assemblies; the latter, of 167 members, elected directly by the people for 3 years, in the proportion of 1 to 20,000 inhabitants. These bodies depute the executive authority to the federal council (*Bundes Rath*), consisting of seven members, and holding office 3 years. The pres. and vice-pres. of the federal council are the first magistrates of the republic. There is also a court called the federal tribune (*Bundes Gericht*), which acts as a high court of appeal, and consists of 16 members and 9 substitutes elected by assembly. Different systems of law still prevail in the different cantons, which to some extent resemble each other, the most of them having grown out of the old German codes. Except in a few frontier cantons, the Roman law has been little regarded. Until 1874, the law of the Rom. Cath. cantons prescribed, for certain offenses, various degrees of corporal punishment, exposure on the pillory, and public penance in the churches; but in that year capital and corporal punishments were abolished throughout the confederation. In 1879 the cantonal governments were granted the right to restore capital punishment. In S., property is much subdivided; of 485,000 heads of families, about 465,000 possess landed property.

A peculiarity of the existing Swiss constitutions, federal and cantonal, is the *Referendum*, an institution whereby the people are enabled to approve or veto all laws. In some of the cantons all bills or laws of the cantonal council *must* be submitted to the people: this is the 'obligatory' Referendum. In other cantons the Referendum is 'facul-

tative' only—i.e., bills must be submitted to the people on formal demand of a certain number of electors. There is facultative Referendum with regard to all federal laws: they must be submitted to popular vote on demand of 30,000 electors or of 8 cantons. When by obligatory or by facultative Referendum a project of law, or a bill, after discussion in cantonal council or in federal assembly, is submitted to the judgment of the people, the voter writes 'yes' or 'no' on a printed voting paper and deposits that in an urn under official control. When 50,000 electors, or either house of the federal assembly, demand a revision of the federal constitution, the question of revision (and afterward the draught of the amendments) must be submitted to the people. It is seen that by the Referendum both the veto power and (largely) the initiative in legislation are held in the hands of the people themselves. The wisdom of the framers of the Swiss constitutions in thus approaching the model of pure democracy is proved by the result; for in the 12 yrs. immediately succeeding the allowance of the Referendum with regard to federal laws (1874—86), only 19 out of 107 federal laws or bills were challenged by the people or the cantons, and of these 6 were approved and 13 vetoed.

There is no standing army, but every citizen is obliged to serve as a soldier, and military drill is taught at all the schools. It is estimated that in war S. could speedily put 250,000 trained soldiers in the field.

Language and Religion.—In the sequestered valleys of the Grisons, two-thirds of the population still speak a Latin dialect known as the Romaunsh; Italian dialects have penetrated up the valleys of Ticino; French patois has invaded western S., by the Rhine and the valleys of the Jura, to Laufen, the frontier of Soleure, Lake Morat, the Upper Saane, and Siders in the Valais. In the rest of S. the dialects are German. Of every 1,000 Swiss, 713 speak German, 213 French, 56 Italian, and 14 Romaunsh. The Reformation in S. spread chiefly from Basel, Bern, and Geneva, and the chief Prot. districts are the countries communicating with these towns. The Alpine region is almost entirely Rom. Cath., the seven Rom. Cath. cantons being Lucerne, Zug, Schwyz, Uri, Unterwalden, Valais, and Ticino. Out of 1,000 Swiss, 411 are Rom. Catholics, 587 Protestants, and 2 Jews.

Education.—In no country is elementary instruction more widely diffused: parents are compelled to send their children to school, or have them privately taught, from the age of 6 to 12. There are universities on the German model at Basel, Bern, and Zürich; and on the French plan a univ. at Geneva and academies at Lausanne and Neufchatel. The number of clubs for scientific and literary, musical and social purposes, is remarkable. There are few scholarly pursuits not represented by societies in S. The local political assemblies and other public meetings give ample employment to the newspaper and periodical press. In S. there are 500 journals and reviews, 250 being political journals, and the remainder literary and

scientific. There are 40 daily papers. This active intellectual life is chiefly in the Prot. cantons.

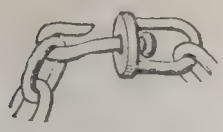
History.—S. was in Roman times inhabited by two races —the Helvetii, supposed to have been Celts, on the n.w.; and the Rhætians (of unknown origin) on the s.e. After the conquest of Gaul, both races adopted the language and habits of Rome. When the invasions took place, the Burgundians settled in western S.; while the Alemanni, another Germanic tribe, took the country e. of the Aar. A third Teutonic people, the Goths, entered from Italy, and took possession of the country of the Rhætians, which nearly corresponded with the Grisons. The Burgundians adopted Christianity in the end of the 5th c.; the Helvetii retained their pagan creed until the 7th c., when they were converted by Irish monks, who founded abbeys and churches, which still exist. S., in the early middle ages, formed part of the German empire, and feudalism sprang up in the Swiss highlands even more vigorously than elsewhere. During the 11th and 12th c., the greater part of S. was ruled on behalf of the emperors by the lords of Zähringen (q.v.), who did much to check civil wars and to promote the prosperity of the towns. They, however, became extinct 1218, and then the country was distracted by wars among the leading families. The great towns united in self-defense, and many obtained imperial charters. In 1273 Rudolf of Hapsburg, Swiss nobleman who had favored the independence of the towns, became German emperor. After doing so, he continued the same policy; but his son, Albert I. (q.v.), took another course. He attacked the great towns, and was defeated. The leading men of the Forest Cantons, which for ages had yielded a merely nominal recognition of the empire, and had acknowledged no feudal superior, met on the Rütli meadow 1307, Nov. 7, and resolved to expel the Austrian bailiffs or landvögte: see TELL. The war terminated in favor of the Swiss at Morgarten 1315. Schwyz, Uri, and Unterwalden, with Lucerne, Zürich, Glarus, Zug, and Bern, eight cantons in all, 1352, entered into a perpetual league, the foundation of the Swiss Confederation. Wars with Austria followed, which terminated favorably for the confederates at Näfels (q.v.) and Sempach (q.v.). In 1415 the people of the cantons became the aggressors. They invaded Aargau and Thurgau, parts of the Austrian territory, and annexed them; three years later, they crossed the Alps, and annexed Ticino, and constituted all three subject states. The Swiss were next engaged in a struggle on the French frontier with Charles the Bold of Burgundy. They entered the field with 34,000 men, to oppose an army of 60,000, and were successful, gaining the famous battles of Granson and Morat 1476. In 1481, the towns of Freiburg and Soleure were admitted into the confederacy. In 1499 Emperor Maxmilian I. made a final attempt to bring S. again within the bounds of the empire. He sought to draw men and supplies from the inhabitants for his Turkish war; but in vain. He was defeated in six desperate engagements. Basel and Schaffhausen (1501), and Appen-

zell (1513), were then received into the Confederation, and its true independence began. The abbacy of St. Gall, the cities of St. Gall, Mühlhausen, and Bienne, became associated states, with a vote at the diet. Geneva, Neufchatel, Valais, and the Grisons, also became associated states, but without a vote.

New troubles sprang up with the Reformation. Zwingli began to preach in the beginning of the century; and Zürich, 1523, adopted his opinions, and was followed by Bern and other cantons of the north. The Forest Cantons remained attached to the Church of Rome. War broke out 1531, between the Rom. Catholics and Protestants, and the Rom. Catholics were successful at Cappel, where Zwingli was slain. This victory to some extent settled the boundaries of the two creeds in eastern S. In 1536, however, Bern wrested the Pays de Vaud from the Dukes of Savoy, and annexed it. In the same year, Calvin settled at Geneva, and the Reformed doctrines spread throughout Western S. During the Thirty Years' War, Bern—which had become, since the conquest of Vaud, the leading canton—and Zurich, contrived to maintain with great skill the neutrality of S.: and in the treaty of Westphalia, 1648, it was acknowledged by the great powers as a separate and independent state. At this period, the Swiss, in great numbers, were employed as soldiers in foreign service, and the record of their exploits gives ample evidence of their courage and hardihood. Internally, there was great stagnation. The constitution of the larger cantons became more aristocratic, i.e., the mass of the people lost their power over the governing bodies. In Zürich, Schaffhausen, and Basel, the governing councils were elected by the corporations; and in Bern, Freiburg, Soleure, and Lucerne, a few families had acquired permanent rule. At the end of the 18th c., there was widespread discontent with this state of matters; but the French Revolution of 1789 broke out, and wars followed, which precluded its manifestation. In 1798, S. was seized by the French. At the peace of 1815, its independence was again acknowledged. The new Confederation was divided into 22 cantons, each represented in a diet, which was appointed to hold its annual meetings alternately at Bern, Zürich, and Lucerne. The old abuses which had crept into the constitutions of the cantons were revived, and representation in most of them became based on property qualifications. Officials, the aristocracy, and the clergy joined to oppose innovations, and succeeded in doing so until 1830, when the French Revolution of 1830 broke out: then armed demonstrations were made against the towns, and universal suffrage was generally conceded. Basel town, however, held out: but the difficulty was settled by separation of the town and country districts—the former remaining conservative, the latter becoming democratic. Geneva and Neufchatel retained their old constitutions. The result of the changes was, however, that two-thirds of the whole population were allowed to take part in public affairs. The consequences were not what had been

expected by the liberals, who found that they had not yet the means of strengthening the central power. In 1839, at Zürich, where Dr. Strauss (q.v.) had been appointed prof. of theology, a mob of peasants, headed by the Prot. clergy, overturned the government. In Aargau, a struggle between the liberals and the ultramontane party was settled, after long discussion, by an unsatisfactory compromise. In Valais, where universal suffrage had put power into the hands of the reactionary party, a war ensued, in which the reactionaries were victorious; they then ruled with a strong hand, and actually forbade Prot. public worship within the canton. In Lucerne, the headquarters of the Jesuits, the Ultramontane party acted even more extravagantly; they so persecuted their political opponents, that the latter were compelled to leave the canton. These measures caused deep and wide discontent. In 1844, a proposal was made in the diet to expel the Jesuits; but that body declined to act. The radical party then resorted to force: they organized bodies of armed men, called the Free Corps, which invaded the Rom. Cath. cantons; but they were defeated. Changes favorable to them took place in some of the cantons. The Rom. Cath. cantons then formed a league, the Sonderbund, for defense against the Free Corps. There was general clamor for its suppression; but, in the diet, only 10½ votes supported that measure The ruling party in Geneva had been with the majority, and this conduct led to a revolution in that city. One vote was thus gained against the Sonderbund. St. Gall added another; and a majority in the diet, 1847, declared the illegality of the Sonderbund, and decreed the expulsion of the Jesuits. In the war which ensued between the federal army and the forces of the Sonderbund, the former were victorious at Freiburg and Lucerne. The leagued cantons were made liable in all the expenses of the war, the Jesuits were expelled, and the monasteries were suppressed. An attempt was made by diplomatic notes from other countries to intimidate the Swiss govt.; but the revolution of 1848 broke out, and prevented further interference. In the same year, the radical party, convinced of the necessity of a more powerful central government, carried the constitution of 1848. Subsequently, a rebellion took place against the king of Prussia, as Prince of Neufchatel, and that canton was declared a republic, with a constitution similar to that of the other Swiss states. The king of Prussia protested in vain; but 1857 he withdrew all opposition, and remained satisfied with the bare title Prince of Neufchatel, which he still retains. The new federal constitution adopted 1874 confers greater power on the federal body, and reduces that of the several cantons.

SWIVEL, n. *swĭv'l* [Icel. *svif*, sudden movement; *sveifla*, to swing in a circle: Norw. *sviv*, swing; *sveiva*, the crank or handle of a wheel]: a fastening contrived to allow the thing fastened to turn freely round on its axis; a ring which turns on a staple; a small cannon on a pivot or staple, or on two concentric iron rails, and which may be turned in any direction: V. to turn on a pin or pivot. SWIV'ELLING, imp. SWIVELLED, pp. *swĭv'ld.*



Swivel.

SWOLLEN, or SWOLN, v. *swōl'n:* pp. of the verb SWELL, which see: ADJ. largely increased in bulk.

SWOON, v. *swōn* [AS. *swindan*, to consume, to languish: OHG. *swindan*, to languish, to pine: Bav. *schwund*, waste: Ger. *schwinden*, to die away: Gael. *suain*, profound or deep sleep]: to sink into a fainting fit, and appear as if dead: N. a fainting fit. SWOON'ING, imp.: N. act of one who swoons. SWOONED, pp. *swōnd.*

SWOOP, v. *swōp* [from SWEEP, which see]: to take or seize with a sweeping movement; to catch while on the wing; to catch up: N. a sweeping movement; a sudden falling on and seizing, as a bird of prey on its victim. SWOOP'ING, imp. SWOOPED, pp. *swōpt.*

SWOP, v. *swŏp* [another form of SWAP: W. *chwap*, a sudden stroke or blow]: to exchange; to barter: N. an exchange; a barter. SWOP'PING, imp.: N. the act of exchanging or bartering. SWOPPED, pp. *swŏpt.*

SWORD, n. *sōrd* [Ger. *schwert;* Dut. *zwaard;* Dan. *sværd;* Icel. *sverd*, a sword]: weapon consisting of a long knife-like blade of steel, one side—and sometimes both sides—having a sharp cutting edge, and set in a hilt or handle—used, with a motion of the whole arm, for stabbing and cutting: *figuratively*, destruction by war; vengeance or justice; emblem of power or of triumph; the profession of arms. —The S. was in use when history began. Damascus and Toledo blades have been brought to such perfection that the point can be made to touch the hilt and to fly back to its former position. In the 18th c. every gentleman wore a sword; now its use is almost confined to purposes of war. In the army, all officers and sergeants, with troopers of cavalry, wear swords for cutting and thrusting. In the navy, all officers wear similar swords; and the men, in time of action, heavy-backed swords, called *cutlasses.* In the French service, nearly all troops wear a combination of the sword with the Bayonet (q.v.), called a sword-bayonet.—See RAPIER: CUTLASS: BROADSWORD: SCIMITAR: SABRE: FENCING: also consult Capt. Burton's *Book of the Sword* (I. 1884). SWORDER, n. *sōrd'ĕr*, in *OE.*, a cut-throat; a soldier. SWORD'LESS, a. *-lĕs*, without a sword. SWORD-ARM, the right arm. SWORD-BAYONET, bayonet having a shape somewhat like a sword. SWORD-BEARER, city officer who carries the sword as the emblem of authority and justice before the chief magistrate. SWORD-BELT, belt round the waist from which the sword is suspended. SWORD-BLADE, knife or cutting part of a sword. SWORD-CUT, a wound

with a sword. SWORD-DANCE, in *Highlands of Scot.*, dance performed over two swords laid crosswise on the ground. SWORD-FIGHT, combat in which swords are the weapons. SWORD-SHAPED, a. shaped like a sword; ensiform. SWORDSMAN, one skilful in the use of the sword. SWORDSMANSHIP, n. skilful use of the sword. SWORD-STICK, or SWORD-CANE, walking-stick in which a sword is concealed. SWORD OF STATE, the sword borne on great occasions before kings, lords, magistrates, etc. TO SURRENDER HIS SWORD, to submit on defeat to the conqueror by the vanquished commander delivering his sword. TO BREAK HIS SWORD, to degrade him from his rank.

SWORD'-FISH (*Xiphias*): typical genus of fishes of family *Xiphiidæ*, having the upper jaw remarkably elongated and compressed, in the form of a sword or dagger. The body is long in the common S.-F. (*X. gladius*), attaining 10–15 ft., and the sword 3 ft. Except in a young stage, it has no teeth and scales; and the dorsal fin is long and continuous in the adult. It is without a ventral fin. It is plentiful in the Mediterranean, and in the Pacific and Atlantic; occuring abundantly on our s. coast from Nova Scotia to New York. It is bluish black above, and silvery white on the belly, one color passing gradually into the other. It is highly esteemed for food, both fresh and salted. It is harpooned by fishermen, and is powerful enough to drag a boat for hours after being struck. It attacks the whale with this formidable weapon, often killing the cetacean with repeated stabs. It preys much on mackerel. Instances are not rare of ships' bottoms being perforated by the sword, and small boats are easily pierced by it. Instances are on record of the piercing through copper sheathing, oak-plank and timber, as far as 10 inches; and Prof. Owen compares such a stroke to the impact of a heavy artillery projectile. Usually the part which enters a ship's side cannot be withdrawn, and remains in the wood.—On the coasts of the United States the species attains 7 to 12 ft. in length and 400 lbs. weight. About 50 schooners in this fishery annually take about 3,400 fish, of value about $45,000.

SWORE, v. *swōr:* pt. of SWEAR. SWORN, v. *swōrn*, pp. of SWEAR, which see.

SWOUND, n. *swowND* [for SWOON]: in *OE.*, a swoon; a fainting fit.

SWOUNS, n. plu. *swowNz* [corrupted from GOD'S WOUNDS]: in *OE.*, an oath by *God's wounds*, that is, 'Christ's wounds': also ZOUNDS.

SWUM, v. *swŭm:* pt. and pp. of SWIM, which see.

SWUNG, v. *swŭng:* pt. and pp. of SWING, which see.

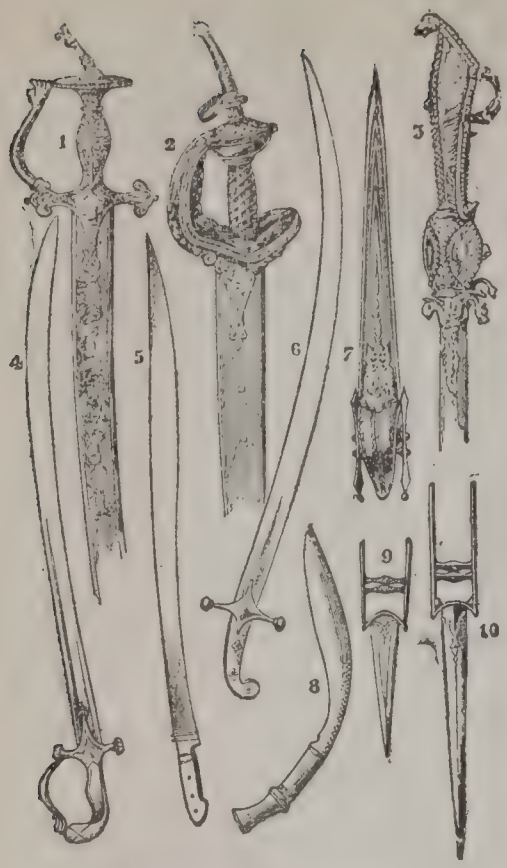
SYBARIS, *sĭb'ā-rĭs*, and CROTON, *krō'ton* (or CROTO'NA): two celebrated Greek colonies in Magna Græcia (q.v.). Sybaris—founded B.C. 720, by Achæans and Trœzenians—was in the s. of the Lucanian territory, between the rivers Crathis (*Crati*) and Sybaris (*Coscili*), about 3 m. from the Tarentine Gulf; and Croton—founded B.C. 710, by Achæans—about 50 m. s.s.e. on the coast of Bruttium. All that is certainly known concerning these cities before the destruction of Sybaris is that they both rapidly increased in size, wealth, and power, extending their dominions across the peninsula, and founding other colonies, while on friendly terms with each other. Sybaris is said to have been 6 m. in circumference, and Croton 12 m.; Sybaris being notorious for the excessive and fastidious luxury of its inhabitants (hence the term Sybarite), and the Crotoniates noted for their perfection in athletic exercises—the famous athlete Milo (q.v.) having been a native of Croton. Between B.C. 540–530, Pythagoras (q.v.) settled at Croton, and exercised great influence over the aristocratic government. Sybaris (B.C. 6th c.) was probably far the most opulent and splendid of Hellenic cities. About B.C. 510, a democratic leader, Telys, deposed the oligarchy of Sybaris, banished 500 of the leading citizens, and assumed the tyranny of the city. The banished citizens having taking refuge in Croton, Telys demanded their surrender; and being refused, declared war against that city. The Sybarites, with an army said to have amounted to 300,000, met 100,000 Crotoniates, commanded by Milo, at the river Træis, were completely routed, and their city was razed to the ground, and obliterated by their adversaries changing the course of the Crathis so as to sweep it away. About B.C. 443, Thurii was founded near the site. After the destruction of Sybaris, Croton appears to have gradually declined, suffering from internal convulsions (see PYTHAGORAS), as well as from disasters in its wars with the Locrians, Rhegians, B.C. 480, and Bruttians, also in the wars of Dionysius (q.v.) of Syracuse and Pyrrhus (q.v.). Its ruin was completed in the second Punic war; and though, B.C. 194, it was colonized by Roman citizens, it never again rose to importance. Croton in the time of Herodotus, and later, was famous for a medical school.—The modern town Cotroné stands very near the ancient site; pop. 6,878.

SYBARITE, n. *sĭb'ă-rīt:* inhabitant of anc. *Sybaris* (q.v.), in Italy, noted for its luxury; an effeminate voluptuary. SYB'ARIT'IC, a. *-rĭt'ĭk*, pertaining to or resembling a Sybarite. SYB'ARIT'ISM, n. *-ĭzm*, luxuriousness; effeminacy.

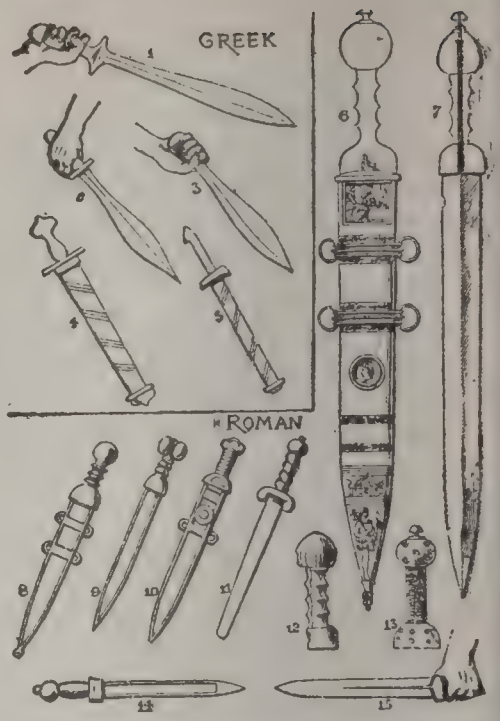
SYBO, n. *sī'bō*, SYBOES, n. plu. *sī'bōz* [F. *ciboule*—from L. *cæpa*, an onion]: in *Scot.*, a young onion before the bulb has been formed; also spelled SEIBOW, n. *sī'bō*, and SEBOW, n. *sē bō*.

SYCAMINE, n. *sĭk'ă-mīn* [Gr. *sūkamīnos*]: supposed to be the black mulberry-tree, but the species is uncertain; the *Mōrus nĭgra*, ord. *Morācĕæ:* see MULBERRY (Black).

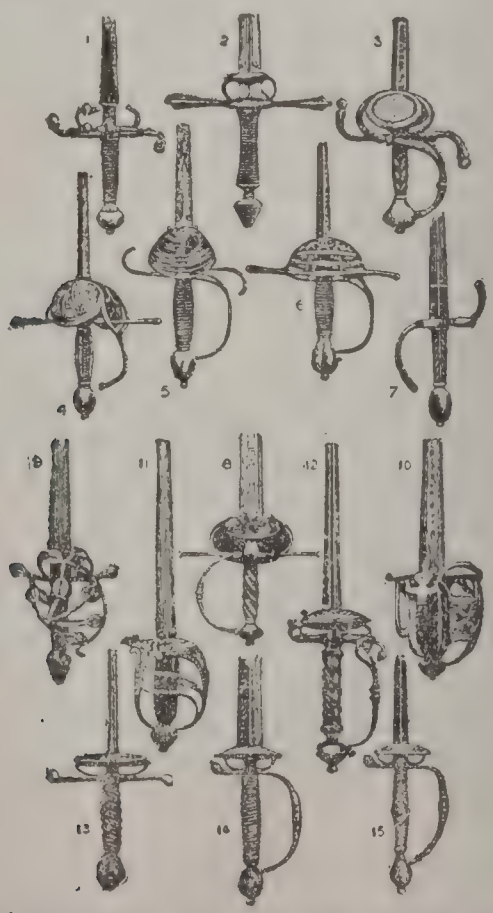
PLATE 5.



Oriental Swords.
1 and 2. Decorated Persian S.; 3. Gauntlet S.; 4. Common Indian type; 5. Yahtagan type; 6. Persian; 8. Nepal; 7, 9, 10. Mahratta.



Greek and Roman Swords.
1-5. Greek; 6-15. Roman.



Typical European Swords 16th to 18th Century.
1. Early 16th c.; 2. German, 1550; 3. Italian Rapier, 1575; 4. Spanish Rapier, 1590; 5, Italian Rapier, 1590; 6 English Rapier, 1590; 7. English Musketeer's Sword, early 17th c.; 8. Spanish Broadsword, early 17th c.; 9, 10. Italian, late 16th c.; 11, English, time of Cromwell; 12. French Rapier, 1650; 13. German Flamburg, early 17th c; 14, 15. Small S., 1700-1750.

SYCAMORE, n. *sĭk'ă-mōr* [see SYCOMORE], or more properly SYCOMORE, *sĭk'ō-*: name applied to trees of very different orders. The Egyptian S. or Sycomore Fig (*Ficus sycamorus*), supposed to be the S. of the Bible, is a large tree, very abundant in Egypt and in parts of w. Asia, often planted near villages for its shade, its wide-spreading head sometimes covering 120 ft. in diameter. The figs are top-shaped, and grow in clustered racemes on the trunk and oldest branches: they are sweet, well flavored, and somewhat aromatic. The wood is light, porous, and of little value. It has been supposed that the cases of Egyptian mummies are made of it, but this is disputed. Other species are found in Abyssinia, s. Africa, etc.

The sycamore-tree of Britain (*Acer pseudo-platanus*) is a forest tree, a species of Maple (q.v.). In parts of N. America, the name S. is given to the Plane (q.v.) of that country, *Platanus occidentalis*, but it is more generally known as Buttonwood: see PLANE-TREE. Still other kinds of trees in Australia and vicinity are known by the name S.

SYCEE, n. *sī-sē'*: fine uncoined silver in lumps of various sizes, used by the Chinese as money, and reckoned by weight; the liang or ounce (called tael by foreigners) being the unit of reckoning (see TAEL).

SYCHNOCARPOUS, a. *sĭk-nō-kär'pŭs* [Gr. *suchnos*, frequent; *karpos*, fruit]: in *bot.*, possessing the power of producing fruit many times without perishing, as is the case with all trees and herbaceous perennials.

SYCITE, n. *sī'sīt* [Gr. *sukitēs*, fig-like; *sukon*, a fig]: a nodule or pebble resembling a fig.

SYCOMA, n. *sī-kō'mă* [Gr.—from *sukon*, a fig]: a fig-shaped tumor.

SYCOMORE, n. *sĭk'ō-mōr* [Gr. *sukomorŏs*, the fig-mulberry—from *sukon*, a fig; *moron*, a mulberry]: large tree allied to the common fig, whose fruit, shaped like the fig, has a sweet and delicate taste—found in Egypt and Syria: see SYCAMORE (usual though less correct spelling): also FIG.

SYCONUS, n. *sĭ-kō'nŭs*, or SYCO'NIUM, n. *-nĭ-ŭm* [Gr. *sukon*, a fig]: in *bot.*, an aggregate fruit where many flowers have been developed upon a fleshy receptacle, which is either a flattened disk or forms a nearly closed cavity, as in the fig.

SYC'OPHANT, n. *sĭk'ō-fănt* [L. *sycophan'ta*; Gr. *sukophan'tēs*, one who informed against those who exported figs from Attica contrary to law, a tale-bearer—from *sukon*, a fig; *phainō*, I show]: a flatterer of princes and great men; a parasite; a mean or servile flatterer. SYC'OPHANCY, n. *-făn-sĭ*, obsequious and mean flattery; servility. SYC'OPHAN'TIC, a. *-făn'tĭk*, flattering meanly; parasitic. SYC'OPHAN'TISH, a. *-tĭsh*, like a sycophant. SYC'OPHANTISM, n. *-tĭzm*, mean flattery; sycophancy.

SYCOSIS, n. *sĭ-kō'sĭs* [Gr.—from *sukon*, a fig]: a skin disease, characterized by the formation of patches of tubercles on the skin of the chin or upper lip.

SYDENHAM, *sĭd'ĕn-am:* chapelry in the parish of Lewisham, county of Kent, England, with a station on the London and Croydon railway; 8 m. s. of London. of which it is a pleasant suburb. The Crystal Palace was erected here (not within the exact boundary of S.) 1854, chiefly from the materials of the building of the Great Exhibition (1851). The cost of the erection and appointment of the Crystal Palace amounted to nearly £1,500,000. The building is 1,600 ft. long, 380 wide, and at the centre transept 200 ft. high. The chief arts and sciences illustrated by the collections within the Palace and grounds, are Sculpture, Architecture, Painting and Photography, Mechanics and Manufactures, Botany, Ethnology, Paleontology, Geology, and Hydraulics. There are two concert-rooms, within the larger of which performances have taken place at which there were 5,000 vocalists and instrumentalists. The park and gardens occupy nearly 200 acres, and are adorned with sculptures, stone balustrades, etc., and fountains perhaps the finest in the world. Pop. (1871) 19,065; (1881) 26,076; (1891) 34,162.

SYD'ENHAM, THOMAS, M. D.: great English physician: 1624–1689, Dec. 29; b. Winford Eagle, Dorset; of good parentage. He was educated at Magdalen Hall, Oxford. A French writer states that he afterward studied at Montpellier. He graduated at Oxford as bachelor in medicine 1648. Through the interest of a near relative, he obtained a fellowship of All Souls College, and there continued his medical studies. He left the univ. without taking a doctor's degree, which long afterward he took at Cambridge. He settled as a practitioner at Westminster, and practiced so successfully that, when only 36 years of age, he had gained the reputation of being one of the first physicians of the period. In his later years, he was much afflicted by gout, of which he died. S. was not profoundly accomplished as a man of science; even in his own times he was inferior to several of his contemporaries; but in sagacity of observation and accuracy of diagnosis, he was unsurpassed. He was exceedingly independent and plain-speaking, eschewed all pretentious mystery, followed common sense and cured his patients—using as little medicine as possible. This practice—on principles which the medical profession has since largely accepted—aroused great distrust and opposition from the medical faculty of his time. Many anecdotes are current, illustrating his peculiar directness and independence. His skill and his philosophic cast of mind secured him the admiration and friendship of Locke; and his contributions to medical literature received the praise of Haller and Boerhaave. His writings have been often republished in England and on the continent, the ed. entitled *Opera Medica* (Geneva 1716) being the best. He gave attention first to fevers, publishing 1666 his famous treatise *Methodus Curandi Febres Propriis Observationibus Superstructa*, reprinted 1675, with additions. His treatment of the then destructive malady of smallpox was especially felicitous, substituting for the stimulating regimen in vogue the

antiphlogistic method of cool air and salines. The most scholarly translation of his works into English is that of Dr. R. G. Latham, in the Sydenham Society's series.

SYDNEY, *sĭd'nĭ:* town, seaport, and cap. of Cape Breton co., Nova Scotia; on Cape Breton Island, Sydney Harbor; and on the Sydney and Louisburg and the International railroads; 5 m. from N. Sydney, 285 m. from Halifax. It has an excellent harbor; valuable coal mines 18 m. distant; railroads connecting with all the N. S. coal-mining centres; large export trade in coal, butter, and cattle; 6 churches, co. court-house, and 3 weekly newspapers; and weekly steamer communication with Halifax. —North Sydney (esti. pop. 4,650) is connected with it by daily steamer, has important commerce, fisheries and coal trade. Pop. of S. (1891) 2,426; (1901) 9,909.

SYD'NEY: city, cap. of New South Wales, and the oldest city in Australia; on the s. shores of Port Jackson, a magnificent harbor; lat. 32° 52′ s., long. 151° 11′ e. The first party of British settlers that reached New Holland were landed at Botany Bay (q.v.) 1788, Jan. 20. The spot which they selected being found ineligible, it was abandoned a few days afterward, and the settlement was transferred about seven m. n., where S. now stands. The locality was chosen chiefly because of a stream of fresh water there, flowing into the deep inlet known as Sydney Cove, one of the numberless bays into which the basin of Port Jackson is divided. This basin or harbor is a magnificent expanse of water, completely land-locked, admitting vessels of the largest size; extends—with a varying width, scarcely anywhere exceeding 1 m., and generally much less—about 20 m. inland, ramifying irregularly in every direction. Its bold and rocky shores present a succession of picturesque and beautiful landscapes. The cliffs which form the general outline of this harbor often rise 200 to 250 ft. At other points the coast presents a lower level, consisting of a series of terraces and smooth sandy beaches. Not many places on the globe are more obviously suitable for a great metropolis. The whole circumference of the bay round which S. is built—about 8 m. from the sea—forms a series of natural wharves, where vessels of 2,000 tons burden can be moored within 60 ft. The narrow entrance (1 m. wide) of Port Jackson—through what is called the 'Heads'—can easily be made inaccessible to any hostile fleet; while the central position of S makes it necessarily the permanent emporium of the greater number of the British dependencies in the southern hemisphere. The immense coal formation of E. Australia extends n. and s. about 500 m., with a breadth of 80 to 100 m. S. stands nearly in the centre of this great carboniferous basin; and at various points within a radius of 30 to 100 m., large quantities of coal are raised for colonial consumption and for export. The sandstone rock on which the city stands affords valuable material for building.

For many years S. held a monopoly of the commerce of these antipodean regions: it has now formidable rivals in Melbourne, Adelaide, and the settlements of Queensland,

It must, however, remain the exclusive outlet for the productions and commerce of extensive pastoral and mineral districts on the n.w., w., and s.w. The e. shore of Darling harbor has its frontage entirely occupied with wharves and quays.

The streets in the older parts of the town are narrow and irregular; but several of the modern streets, in their breadth and the size and style of the buildings, are not inferior to those of the principal towns of Europe. The shops, warehouses, and private buildings in George and Pitt streets present long and compact lines of well-built stone edifices, often in very ornate and ambitious architecture. The chief thoroughfares are paved, and lighted with gas, and a system of underground drainage has been carried out at a cost of nearly half a million sterling. There is an abundant supply of pure water from a natural reservoir. There are numerous parks near the city. The Botanical Gardens, finest in the colonies, cover 38 acres. S. has one shipbuilding establishment. The Fitzroy Dry-dock, originally intended for vessels of the royal navy, can take in vessels of the largest size. Port Jackson is strongly defended by heavy batteries and submarine mines. It is the chief Brit. naval depot in Australasia. The *climate* of S. is, on the whole, temperate and healthful.

Among public buildings, by far the most important, not only in S. but in the whole of Australia, is the univ., on a commanding height, in a domain of about 150 acres. The principal façade is 500 ft. in length, and is flanked at its w. end by the Great Hall, of such proportions that, were it in England, it would rank third in size. Lectures are delivered daily during each term on classics, logic, history, chemistry, natural and experimental philosophy, and jurisprudence. The museum contains a collection of Greek, Roman and Egyptian antiquities presented by the former chancellor, Sir C. Nicholson. There are three suffragan colleges (denominational) affiliated with the univ.—St. Paul's (Anglican), St. John's (Rom. Cath.), and a Presb. college. The univ., erected by public funds, has a permanent endowment of £5.000 a year from the civil list; and each of the suffragan colleges receives aid toward its building fund, and the stipend of the warden and rector. Eighteen free scholarships, annual value £50 each, are established in the univ., besides others founded by private benefactors. The univ. is incorporated under an act of the colonial legislature and by royal charter. It is empowered, however, to confer degrees only in arts, law, and medicine; and, so far as the univ. is concerned, instruction is limited to purely secular teaching. The religious training of the pupils is left to the affiliated colleges. Other notable public buildings are the royal mint, free library, national gallery, and the observatory. The metropolitan Cathedral of St. Andrew is a handsome building in the later Perpendicular style. Many of the churches, more than 120 in number, of various religious denominations, are tastefully designed. Among buildings for secular purposes, the most imposing and effective, in size and architecture, are the residence of the

governor, the exchange, the custom-house, the town-hall, the new post-office, and the public grammar-school. The neighborhood of S., with every nook in the adjacent bays, is studded with elegant villas and snug cottages, surrounded by their park-like grounds, and gardens of orange-trees, bananas, and numberless semi-tropical plants unfamiliar to the English eye of the newly arrived immigrant. There are numerous manufactories; one with 350 hands makes boots and shoes, and 32 make clothing; one steam joinery employs 250 hands. S. has three theatres, several mechanics' institute, several hospitals for the sick, an orphan asylum, and other charitable and benevolent institutions. In 1879 S. successfully carried out its International Exhibition on a large scale.—Pop. (1881) 220,427; (1891) 386,400; (1901) 496,990.

SYD'NEY, ALGERNON: see SIDNEY.

SYE'NE: see ASSOUAN.

SYENITE, n. *sī'ĕ-nīt* [from *Syene*, in Upper Egypt, where found]: granitic rock composed of quartz, felspar, and hornblende—differing from true granite in having the mica replaced by hornblende (see GRANITE). The 'Quincy granite' is a good example. The felspar is generally red (sometimes white), and the hornblende gives a mottled red and dark green color to the rock. The name S. was formerly given also to any granitic rock in which hornblende predominates. SY'ENITIC, a. *-ĕ-nĭt-ĭk*, containing or resembling syenite.

SYEPOORITE, n. *sī'ĕ-pōr'īt:* a sulphide of cobalt, of a steel-gray color, found at *Saipoor*, in India—used by Indian jewellers to give a rose-color to gold.

SYKES, *sīks*, GEORGE: 1822, Oct. 9—1880, Feb. 9; b. Dover, Del.: milit. officer. He graduated at the U. S. Milit. Acad., and was appointed brev. 2d lieut. 3d inf. 1842; was promoted 1st lieut. 1846; capt. 1855; maj. and brig.gen. vols. 1861; brev. col. U. S. A. and maj.gen. vols. 1862; brev. brig. gen. and maj. gen. U. S. A. 1865; and col. 20th inf. 1868. He served through the Mexican war; on frontier and Indian duty; commanded the regulars in the first Bull Run and in the defense of Washington, and the 5th corps at Gettysburg, and till 1864, Apr.; and from 1877 till his death was in command at Fort Brown, Texas.

SYKES, OLIVE (LOGAN): actress and author: b. Elmira, N. Y., 1841, Apr. 16; sister of Eliza and Celia Logan. She made her first appearance in Philadelphia, 1854; but soon went to England for study. In 1864 she reappeared in New York in a play of her own writing, *Eveleen*, but retired permanently from the stage 1868. She has since lectured on various subjects, written for newspapers and magazines, and published several books. In 1890 she was elected a member of the Incorporated Soc. of Authors, of London. She m., 1892, James O'Neill Logan.

SYL-, prefix, *sĭl:* the form taken by the Greek prefix *sun*, with, before words beginning with the letter *l*.

SYLLABARIUM, n. *sĭl'lă-bā'rĭ-ŭm*, SYL'LABA'RIA, n. plu. *-rĭ-ă* [mid. L.—from L. *syl'laba;* Gr. *sul'labē*, a syllable (see SYLLABLE)]: a catalogue of the primitive syllables of a language. SYL'LABARY, n. *-bĕr-ĭ*, the syllabic symbols of certain languages; a table of syllables; a syllabarium.

SYLLABLE, n. *sĭl'lă-bl* [L. *syl'laba;* Gr. *sul'labē*, a syllable—from Gr. *sun*, together; *lambanō*, I take]: as much of a word as can be uttered distinctly by one effort of the voice; a word; anything proverbially concise; a particle: V. to pronounce articulately; to utter. SYL'LABLING, imp. SYL'LABLED, pp. *-lă-bld.* SYLLABIC, a. *sĭl-lăb'ĭk*, or SYLLAB'ICAL, a. *-ĭ-kăl*, pertaining to or consisting of a syllable. SYLLAB'ICALLY, ad. *-lĭ.* SYLLAB'ICATE, v. *-kāt*, to form into syllables. SYLLAB'ICATING, imp. SYLLAB'ICATED, pp. SYLLAB'ICA'TION, n. *-kā'shŭn*, the act of forming into syllables, or dividing words into syllables; also SYLLAB'IFICA'TION, n. *-fĭ-kā'shŭn* [L. *facĭō*, I make].

SYLLABUB, n. *sĭl'lă-bŭb:* see SILLABUB.

SYLLABUS, n. *sĭl'lă-bŭs* [mid. L. *syllăbus*, a list (see SYLLABLE)]: an abstract; table of contents; compendium containing the heads of a discourse. *The Syllabus*, in *Rom. Cath. Church*, document published by authority of Pope Pius IX., 1864, Dec. 8 (full title, *Syllabus Propositionum ab Apostolica Sede Damnatarum*); comprising 80 propositions on matters of faith, morals, civil policy, etc., which had been condemned during the pontificate of Gregory XVI. and by Pius himself. The S. was accompanied by the bull *Quanta Cura*, and soon afterward the S. and the bull were published in a volume with the several bulls, letters apostolic, allocutions, etc., in full, wherein the several propositions were originally censured (New York and Ratisbon: F. Pustet). In France the govt. prohibited publication of the S. and of the bull: the documents were denounced by the liberals as 'subversive of social order.' Two bishops were prosecuted for reading the S. and bull from the pulpit. William E. Gladstone (1874) issued a pamphlet (*The Vatican Decrees*) in which he animadverted on the teaching of the bull and S. with regard to liberty of the press, of speech, of conscience, etc. As regards the doctrinal authority of the S., theologians are not agreed whether its condemnations are *ex cathedra* teachings or not.

SYLLEPSIS, n. *sĭl-lĕp'sĭs* [Gr. *sullēpsis*, a taking together—from *sun*, together; *lambanō*, I take]: in *gram.*, a figure by which we accept the sense of words rather by the intention of the author than by their strict grammatical import; the agreement of a verb or adjective with one rather than another of two nouns, with either of which it might agree. SYLLEP'TIC, a. *-tĭk*, or SYLLEP'TICAL, a. *-tĭk-ăl*, of or pertaining to.

SYLLOGISM, n. *sĭl'lō-jĭzm* [L. *syllogis'mus;* Gr. *sullŏgis'mos*—from *sun*, together; *logiz'omai*, I reckon—from *logos*, a word, reasoning]: form of argument consisting of three terms or propositions, the first two called the premises, the third the conclusion; and these propositions are such that if the premises be allowed as true, the conclusion also must be allowed as true (see below). SYL'LOGIZE, v. *-jīz*, to reason by syllogisms. SYL'LOGIZING, imp. SYL'LOGIZED pp. *-jīzd*. SYL'LOGIZER, n. *-jī-zer*, one who reasons by syllogisms. SYL'LOGIS'TIC, a. *-jis'tĭk*, or SYL'LOGIS'TICAL, a. *-ti-kăl*, pert. to or in the form of a syllogism. SYL'LOGIS'TICALLY, ad. *-li*.—*Syllogism* is a term expressing a principal branch or department of Logic. When we reason or arrive at truth by means of inference; we are said to proceed either inductively (see INDUCTION) or deductively. Deductive reasoning, fully and methodically expressed, takes the form called syllogism. 'This thing will sink in water, for it is a stone,' is a deductive argument, but not fully stated; the complete form is: 'Stones sink in water; this is a stone: therefore, this will sink in water'—which form is a syllogism. See LOGIC.

To a perfect syllogism it is necessary that there should be three, and no more than three *Propositions* (see PROPOSITIONS); these are the conclusion, or the matter to be proved, and two others that are the means of proving it, called the premises. It is necessary also that there should be three, and no more than three, *terms*, viz., the subject and the predicate of the conclusion, and one, called the middle term, which must occur in both premises, being the connecting link for bringing the two other terms together in the conclusion.—The *predicate* of the conclusion is called the major term, because it is in its scope the largest of the three; the *subject* of the conclusion is the minor term, as being the smallest in scope. The three terms enter into the premises in this manner: the major term and middle term make one premise, called the major premise; the middle term and the minor term make the minor premise. In the syllogism above the terms are, 'a thing that will sink in water' (major), 'this thing' (minor), 'stone' (middle); the premises are, 'stones sink in water' (major), 'this thing is a stone' (minor); the conclusion is, 'this thing will sink in water.'

The form thus given, though the regular and fundamental form to prove any affirmative conclusion, is not the only form that an argument may assume. The totality of syllogistic forms is divided into *figures*, and each figure into *moods*, which are the distinct syllogistic forms; the principle of division being as follows. The figure is determined by the position of the middle term; which may be the *subject* of the major premise, and the *predicate* of the minor (1st figure), the *predicate* in both (2d figure), the *subject* in both (3d figure), the *predicate* of the major and the *subject* of the minor (4th figure).

The word 'figure' is borrowed from rhetoric, where it means a departure from plain and ordinary speaking, as metaphor, hyperbole, etc. But, as remarked by Hamilton,

only the last three of the foregoing enumeration should be called 'figures.' The first should be considered as embracing the regular forms of reasoning, and the others as properly figures—that is, forms more or less inverted, irregular, or unnatural, though still correctly representing reasonings that actually occur. These forms may all be *reduced* to forms in the first figure; their inversions or distortions being, as Hamilton would say, *redressed*, or restored to the primitive and fundamental type, viz., the syllogisms of the 1st figure.

The 4th figure did not belong to the original scheme of Aristotle, and it is usually considered as both unnatural and unnecessary, being only an awkward inversion of the first. There would then be the natural or standard syllogisms (the 1st fig.), and two sets of figurative departures from them (2d and 3d figs.).

The syllogisms of each figure are said to differ in *mood*, or according to the *quality* and the *quantity* of the propositions—that is, according as these are affirmative or negative (quality), universal or particular (quantity).

The entire scheme may be presented as follows: The symbols used are P (predicate of conclusion), major term; S, (subject of conclusion), minor term; M, middle term. [For the use of the terms *Barbara*, etc. (in italic) see below.] The general type of the first figure or standard is.

M is P.
S is M.
S is P.

When the quality and the quantity of the propositions are expressed, there arise four syllogisms of this form—two affirmative, and two negative:

All M are P.
All (or some) S are M. } *Barbara, Darii.*
All (or some) S are P.

All matter gravitates.
All (or some) air is matter.
All (or some) air gravitates.

No M is P.
All (or some) S is M. } *Celarent* and *Ferio.*
No S is P; some S is not P.

No matter is destructible.
All (or some) air is matter.
No air is destructible; some air is not destructible.

The general scheme of the *2d figure* is:

P is M
S is M
S is P.

There are four syllogisms in all, which we may take in pairs thus:

No P is M.
All (or some) S are M. } *Cesare* and *Festino.*
No S is P; some S are not P.

'No destructible thing is matter,' etc., as in the last form.

All P is M.
No S is M; some S is not M. } *Camestres* and
No S is P; some S is not P. } *Baroko.*

In this figure, there is a certain distortion of the previous or regular figure. In the first of the two pairs, the major is, No P is M, instead of the equivalent (1st figure), No M is P. In the first form of the second pair, the minor is, No S is M, instead of the equivalent, No M is S, which should be the major to be regular; the amended premises would then give, in conclusion, No P is S, equal to No S is P.

All matter is extended.
No mind is extended. } *Camestres.*
No mind is matter.

The last form, with a particular conclusion, is exemplified thus:

All matter is extended.
Some things are not extended.
Some things are not matter.

This is a form technically called *Baroko*, which is one of two that are especially difficult to reduce to the standard forms.

This figure proves only negatives.

The scheme of premises in the *3d figure* is

M. P.
M. S.

Six varieties of syllogism come under this figure; we may arrange them in three pairs, the first two pairs having the same major, and the third the same minor:

All M is P.
All (or some) M is S. } *Darapti* and
Some S is P. } *Datisi.*

All planets move.
All (or some) planets are heavenly bodies.
Some heavenly bodies move.

No M is P.
All (or some) M is S. } *Felapton* and
Some S is not P. } *Ferison.*

No solid body is perfectly transparent.
All solid bodies gravitate.
Some gravitating things are not perfectly transparent.

Some M is P; some M is not P. } *Disamis* and
All M is S. } *Bokardo.*
Some S is P; some S is not P.

The first of the two is merely a standard syllogism (Darii), with transposed premises; the second (Bokardo) is more complicated, as in the example:

Some men are not fit to rule.
But all men are liable to have dominion.
Some men, liable to have dominion, are not fit to rule.

In the *4th figure*,

P is M,
M is S,

there are five syllogisms. The mere forms are enough to quote.

All P are M.
All M are S. } *Bramantip.*
Some S are P.

All P are M.
No M is S. } *Camenes.*
No S is P.

Some P are M.
All M are S. } *Dimaris.*
Some S are P.

No P is M.
All M are S. } *Fesapo.*
Some S are not P.

No P is M.
Some M are S. } *Fresison.*
Some S are not P.

The reasons why these syllogisms are true, and why no other of 256 possible combinations of propositions can give true conclusions, are certain laws, called the rules of the syllogism, which repose on first principles of the highest certainty.

Mr. Mill has laid down the following fundamental axioms of the syllogism, as stated in its standard forms in the 1st figure. (1.) 'Attributes coinciding with the same attribute coincide with one another.' M, the middle term, coincides with P, the predicate; S, the subject, coincides with M; therefore S and P coincide with one another. (2.) 'Any attribute incompatible with a second attribute, is incompatible with whatever that second attribute coincides with.' No M is P; M is incompatible with P; but S coincides with M, and therefore it also is incompatible with P.

All the syllogisms of the last three figures are reducible to the first, by conversion of propositions and transposition of premises, according to the nature of the case. The symbolic name of each syllogism contains instruction for this process, as well as stating the composition of the syllogism. To aid the memory, these symbols are put together in five Latin hexameter verses of very ancient but unknown origin:

> Barbara, Celarent, Darii, Ferioque prioris.
> Cesare, Camestres, Festino, Baroko, secundæ.
> Tertia Darapti, Disamis. Datisi, Felapton,
> Bokardo, Ferison habet, quarta insuper addit
> Bramantip, Camenes, Dimaris, Fesapo, Fresison.'

The first line gives the standard figure, and states the propositions entering into each syllogism. The three A's in Barbara are three universal propositions. The E, A, E, in Celarent, are a universal negative, a universal affirmative, a universal negative; in Darii, A, I, I, a universal affirmative and two particular affirmatives, etc. In the other figures the commencing letter (C, B, etc.) shows which standard syllogism each is to be reduced to (Baroko to Barbara, Cesare to Celarent, etc.). The consonant *s* means simple conversion of the proposition marked by the preced-

ing vowel; *p* means conversion by limitation, or *per accidens*; *m* signifies the transposition of the premises; *k* occurs in Baroko and Bokardo, and denotes that these are to be reduced by supposing the conclusion false, and then showing that on that supposition Barbara would be contradicted—from which it is inferred that the original form is true.

There are some species of deductive arguments that do not fall under the syllogistic figures. Thus, the major may state a conditional proposition, and the minor affirm the truth of the condition: 'If the witness is to be believed, the man is guilty' (major); now 'the witness is to be believed' (minor); therefore 'the man is guilty.' A true conclusion would also be obtained by a minor denying the consequent, 'the man is not guilty.' It would then follow that the witness (who affirms his guilt) is not to be believed. But no conclusion would follow from either denying the condition, 'the witness is not to be believed,' or affirming the consequent, 'the man is guilty;' for, in the first place, the man might be guilty whether this particular witness be credible or not; and secondly, the guilt of the man does not prove the credibility of the witness. This is called the *Conditional* Syllogism.

Again, the major may be what is called a Disjunctive or Alternative Proposition, from which also inferences may be drawn by supplying certain minors: 'This was done by either A or B;' now 'it was not done by A (or by B);' therefore 'it was done by B (or by A).' Should the major be understood to mean that it was done by one, and not by both, there would be two other possible inferences: 'It was done by A (or by B);' therefore 'it was not done by B (or by A).' There are other disjunctive pairs—e.g., 'Either A is B, or C is D,' now 'A is not B, therefore C is D,' etc. This is called the *Disjunctive* Syllogism.

A combination of the Conditional and the Disjunctive makes the *Dilemma*. For example:

If A exist, then either B or C exists.
Neither B nor C exists.
Therefore A does not exist.

The following dilemma was given to refute the practice of torturing witnesses: 'A person able to endure pain will be likely to utter falsehood under torture; one unable will be equally likely; therefore a person under torture will be likely to utter falsehood.'

A very great enlargement has been given to the doctrine of the syllogism by Sir W. Hamilton (see QUANTIFICATION), Prof. De Morgan, and Prof. Boole of Cork. They have shown that many more syllogistic pairs can be created, and have invented symbols for the purpose. It is, however, comparatively few, either of the old pairs or of the new, that are assumed by the ordinarily occurring arguments, either in the sciences or in common affairs. By far the most useful part of the syllogism is contained within the limits of the 1st or standard figure, which shows what premises are to be looked out for to prove any conclusion—namely, some *general assertion* of matter of fact, affirmative or negative (major), and a *particular as-*

sertion that a given thing comes under the subject of the general assertion (minor), and therefore falls likewise under its predicate. When an argument is stated in a puzzling or perplexed form, with perhaps the omission of one of its essential propositions, it is well to know how to supply the suppressed premises, and put the argument into regular order: the truth or fallacy of the reasoning then becomes evident at a glance.

SYLLOGOS, *sĭl'lo-gŏs*, THE GREEK LITERARY, of Constantinople: the most learned Greek society existing, founded 1862. Its objects are, encouragement of learned research in all departments, and the moral, social, and intellectual elevation of the Greek race. In 1886 it numbered 800 regular, 100 corresponding, and 125 honorary members, including many of the most eminent scholars of Europe. It has aided or inspired the formation of 100 kindred societies in the Turkish empire and Greece, assisted in establishing schools and providing teachers, and contributed largely to archæological and other knowledge. Its publications are elaborate; one has 161 fac-similes of inscriptions previously unpublished.

SYLPH, n. *sĭlf* [F. *sylphe*, genius of the air—from Gr. *silphē*, a kind of beetle or moth]: imaginary being inhabiting the air; a fairy. SYLPH-LIKE, a. like a spirit. SYLPH'ID, n. *-ĭd*, a little sylph. SYLPH'INE, a. *-īn*, like a sylph.—SYN. of 'sylph': fairy; nymph; elf; peri; fay.—*Sylphs*, in the fantastic system of the Paracelsists, are the elemental spirits of the air, who, like the other Elemental Spirits (q.v.), hold an intermediate place between immaterial and material beings. They eat, drink, speak, move about, beget children, and are subject to infirmities like men; but, on the other hand, they resemble spirits in being more nimble and swift in their motions, while their bodies are more diaphanous than those of the human race. They surpass the latter also in knowledge, both of the present and the future, but have no soul [spirit]; and when they die, nothing is left. In form they are ruder, taller, and stronger than men; but stand nearest to them of all the elemental spirits, by reason of which they occasionally hold intercourse with human creatures, being fond especially of children and of simple harmless people; they even marry with the human race, like the Undines and the Gnomes; and the children of such a union have souls, and belong to the human race.

Sylph, in common usage, has a feminine signification, and is applied to a graceful and (in a poetic sense) ethereal maiden. How this curious change of meaning occurred, is not certain; but it is probably traceable to the popularity of Pope's *Rape of the Lock*, which introduced the term into the world of fashion and literature. For though even in Pope the sylph that guards Belinda is a *he*, yet the poet so refined and etherealized his spiritual agents that they soon came to be associated with all our ideas of feminine grace and beauty; and this may have reacted on the popular idea—always loose and inaccurate—of their character and sex, and brought about the change of

gender in popular usage. See Paracelsus's *Liber de Nymphis, Sylphis, Pygmæis et Salamandris et Cæteris Spiritibus* (Basel ed. of Paracelsus's works, 1590).

SYLT, *sĭlt:* largest island of Germany, in the North Sea; part of the province of Schleswig-Holstein, and 7–12 m. from its coast; nearly 23 m. long and half a mile to 7 m. wide. It has some marsh and moor land, but is chiefly a mass of sand-dunes, about 150 ft. high; and contains the villages Keitum, Westerland, and Morsum. The island has some interesting pagan tombs. Pop. about 3,000.

SYLVAN, a. *sĭl'văn*, also spelled SIL'VAN [L. *silva*, a wood, a forest]: pertaining to a wood or grove; inhabiting woods; woody; shady: N. a wood-god; a satyr. SYLVIC ACID, a crystalline body obtained from resin, isomeric with pinic acid. SYL'VA, n. *-vä*, the forest-trees of any country. SYL'VAS, n. *sĭl'văz*, the woodland region of the plain of S. Amer.; also SELVAS.

SYLVANITE, n. *sĭl'văn-īt:* a name originally given to native tellurium, from its being first found in *Transylvania;* a valuable ore of gold and silver, of a steel-gray or brass-yellow color.

SYLVESTER, *sĭl-vĕs'tĕr* (or SILVES'TER), I., Pope of Rome: died 335 (pope 314–335). His pontificate immediately succeeded that of Melchiades, and is memorable for the great council of Nicæa, in which the heresy of Arius was condemned. S. did not attend the council, but sent two priests—Vitus and Vincentius—as representatives. The story of his baptism of Emperor Constantine is a fiction; and the ancient document *Donation of Constantine*, connected with S.'s name, has long been known as spurious, though dating probably not more than two centuries later than Sylvester.

SYLVES'TER (or SILVESTER) II. (originally called GERBERT), Pope of Rome: b. Aurillac, in Auvergne, early in the 10th c.; d. 1003, May 12 (pope 999–1003). He was educated in the monastery of his native village; but went early to Spain, where he learned mathematics; and afterward to Rome. He was appointed abbot of the great monastery of Bobbio, where he taught with much distinction and success. At a later period he went to Germany as preceptor of young Prince Otho, afterward Otho II.; and ultimately became sec. to the abp. of Rheims, and director of the cathedral school, which became eminent under his care. The abp. having been deposed, S. was elected to the archbishopric; but he was afterward set aside, the deposition of his predecessor having been declared invalid. In 998, however, he was appointed abp. of Ravenna, whence he was called to the pontifical throne, 999, under the name Sylvester II. He was a man of rare acquirements for his age—the most learned of the mediæval popes. He was an adept in mathematics, and in practical mechanics and astronomy, in which department his attainments acquired for him among his contemporaries the evil reputation of a magician. He is believed also to have been acqüainted with Greek, and perhaps with Arabic.

S. was the most distinguished statesman of his age. Of his many works, his letters (printed by Du Chesne in *Historians of France*) have attracted most notice from their bearing on the history of an obscure period, and on the historical discussion as to the ecclesiastical relations of the Roman see and as to the papal infallibility.

SYLVESTER, JAMES JOSEPH, LL.D., D.C.L.: mathematician: b. London, 1814, Sep. 3. He was educated at the Royal Institution, Liverpool, and at St. John's College, Cambridge; became prof. of nat. philosophy at University College, London; was prof. of mathematics at the Univ. of Va. 1841–2; was appointed to a similar chair at the Royal Milit. Acad., Woolwich, 1855; held a similar professorship at Johns Hopkins Univ., Baltimore, 1876–83; and was elected Savilian prof. of geometry at Oxford Univ. 1883, Dec. He founded and was the first editor of *The American Journal of Mathematics;* studied law and was called to the bar; published several hundred scientific memoirs in the *Transactions* of the Royal Soc., and in English, French, Belgian, and Italian periodicals; published *Laws of Verse* (London 1870); made public his theory of reciprocants, in connection with algebra, 1885; and issued a universal funicular solution of Buffon's *Problem of the Needle,* 1890, June.

SYLVESTER, JOSHUA: English poet: 1563–1618; d. in Holland, after a wandering life. His Eng. version of the *Divine Weeks and Works* of Du Bartas obtained a fleeting popularity; and solely because from it Milton is thought to have derived some hints, S lives in literary history as a sort of *nominis umbra.*

SYLVIIDÆ, *sĭl-vĭ'ĭ-dē:* family of birds, the old-world warblers, of order *Insessores,* including a great number of small species, among which are many of the birds most noted for sweetness of song, while something of this power is possessed by almost all the family, so that the name *Warblers* is often used as synonymous with S. The bill is sharp, slender, straight, and rather compressed toward the tip; wings are moderately long; legs slender. To this family belong, in some classifications, the Nightingale, the Blackcap, numerous species known by the name Warbler —the Redbreast, Redstart, Wheatear, Whitethroat, Stonechat, Whinchat, Golden-crested Wren, Hedge-sparrow, etc. —The American warblers are set apart under the family SYLVICOLIDÆ (with a sub-family *Sylvicolinæ,* including the typical wood-warblers), and differ from the *Sylviidæ* in many details, such as bill not decurved nor distinctly notched, the wings with 9 primaries, etc. There are more than a hundred species, of many genera. Another name of the family is *Mniotiltidæ.* See WARBLER.

SYM-, *sĭm* [Gr. *sun*]: a Greek prefix, another form of SYN, which see.

SYMBIOSIS, n. *sĭm-bĭ-ō'sĭs* [Gr. *sumbiōsis,* living with companionship, connection—Gr. *sun,* with; *bios,* life]: in *biol.*, the united life of certain organisms. Some orchids and fungus hyphæ thus obtain nourishment in common.

SYMBOL, n. *sĭm'bŏl* [L. *symbŏlum;* Gr. *sumbŏlŏn,* a sign or mark—from *sun,* together; *ballō,* I throw—*lit.,* the act of several in throwing together portions to form a whole]: sign or mark by which one knows or infers a thing; some outward token by which something moral or spiritual is represented or suggested to the mind; a creed (see CREEDS AND CONFESSIONS· SYMBOLICAL BOOKS); an emblem; a type; a letter or character having a distinctive signification; a religious rite or outward form representing something else; in *OE.,* contribution to a general fund; sentence of adjudication: V. to express by symbols. SYMBOLIC, a. *sĭm-bŏl'ĭk,* or SYMBOL'ICAL, a. *-ĭ-kăl,* expressed or represented by resemblances or signs; figurative; representative; typical. SYMBOL ICALLY, ad. *-lĭ.* SYMBOL'ICS, n. plu. *-ĭks,* the study of symbols of old religions or Christian creeds. SYMBOLIZE, v. *sĭm'bŏl-īz,* to express by symbols; to have a resemblance of qualities or properties; to be typical of. SYM'BOLIZING, imp.: ADJ. representing symbolically. SYM'BOLIZED, pp. *-īzd.* SYM'BOLIZA'TION, n. *-ĭ-zā'shŭn,* act of symbolizing; resemblance in properties or qualities. SYM'BOLIZER, n. one who symbolizes. SYM'BOLISM, n. *-ĭzm,* use of, or the being represented by, symbols; among *chemists,* consent of parts or ingredients. SYMBOLOGY, n. *sĭm-bŏl'ŏ-jĭ,* art of expressing by symbols. SYMBOLICAL BOOKS—in the sense either of *symbol* as a distinctive mark, or of *symbol* as a contribution or putting together—Christian creeds and confessions, authoritative statements of doctrines held by the church general or by divisions of the church.

SYME, *sīm,* JAMES: Scottish surgeon: 1799, Nov. 7—1870, June 26; b. Edinburgh. He received a thorough education in art and medicine, in the Univ. of Edinburgh. In his 19th year he began anatomical studies under Liston, who appointed him his demonstrator. 1825–32 he lectured on surgery in the Edinburgh School; and established a hospital at his own expense, where he delivered a clinical course for four years. In 1831 appeared his well-known treatise on *The Excision of Diseased Joints;* and 1832 his *Principles of Surgery* (many editions since), which established his reputation as a teacher of the first rank. In 1833 he was elected to the chair of surgery in the Univ. of Edinburgh, which he filled with distinction. In 1847 he resigned his Edinburgh chair to fill that vacated in London by the death of Liston; but collegiate misunderstandings induced him, after six months, to return to Edinburgh. His unconciliatory manner in advancing his just views seems to have occasioned frequent disagreements with his co-laborers. As an operator, S. had no superior; as a teacher, few equals. His innovations in surgical practice were characterized by so much ingenuity, controlled by scientific caution, that they were adopted by nearly all great surgeons. His pupils were numerous, and in every quarter of the globe. Besides works above named, he was author of valuable treatises on Diseases of the Rectum; on the Pathology and Practice of Surgery; on the Urethra, etc. See the *Memoir* by Dr. Paterson (1874).

SYMMACHIANS, n. *sĭm-mā'kĭ-anz:* name sometimes given to the Nazarenes or Nazareans: see EBIONITE.

SYMMACHUS, *sĭm'ma-kŭs,* QUINTUS AURELIUS: distinguished Roman orator, scholar, and statesman: dates of birth and death unknown; but he was prefect of Rome 384, consul 391, and was living in 404. He was educated in Gaul. He had not only great wealth, but also high character, and repute for eloquence. A sincere pagan in an age when classic paganism was vanishing away, he proved in his own person a pattern of its choicest virtues, and manfully, though vainly, strove to regain for it its ancient place of honor in the state. He was banished from Rome 382 by the emperor for his protest against the removal of the statue and altar of Victory from the senate-house, but was soon recalled and put into high office. S.'s extant writings consist of ten books of letters (*Epistolarum Libri X.*) and fragments of nine orations. The former were published after his death by his son, and contain not a little that is valuable for the history of the period; but the style is in general a slavish imitation of Livy. The best editions of the Epistolæ are those of Juretus (Par. 1604) and Scioppius (Mainz 1608). The fragments of the orations were discovered by Cardinal Mai in a palimpsest in the Ambrosian Library, and were pub. Milan 1815: afterward, with additions, Rome 1823, in *Scriptorum Veterum Nova Collectio.* See Morin's *Étude sur la Vie et les Écrits de Symmaque, Préfet de Rome* (Par. 1847).

SYMMES, *sĭmz,* JOHN CLEVES: 1742, July 21—1814, Feb. 26; b. Long Island: jurist. He represented Del. in the continental congress 1785–6; was judge and chief-justice of the supreme court of N. J.; was appointed judge of the Northwest Territory 1787; obtained from the federal govt. a grant of 1,000,000 acres of land in the Ohio and Miami valleys 1788; and was the founder of North Bend and Cincinnati.—His nephew, JOHN CLEVES S. (1780–1829, May 28; b. N. J.), entered the U. S. army 1802, served as capt. in the war 1812–15, and afterward applied himself to philosophical pursuits at Newport, Ky. In 1818 he made public his theory that the earth is a hollow sphere, habitable within, open at the poles, and containing several concentric hollow spheres similarly open. He lectured widely on the theory, and petitioned congress vainly to fit out an expedition to prove it.

SYMMETRY, n. *sĭm'mĕ-trĭ* [F. *symétrie*—from Gr. *summet'rĭa,* an apt arrangement of parts or members—from *sun,* together; *metron,* a measure: It. *simetria*]: the due proportion of the several parts of a body to each other; harmony of parts; in *bot.,* a term applied to a flower, in reference to the parts being of the same number, or multiples of each other. SYMMETRICAL, a. *sĭm-mĕt'rĭ-kăl,* proportional in all its parts; having corresponding parts or relations. SYMMET'RICALLY, ad. *-lĭ.* SYMMETRIZE, v. *sĭm'mĕt-rīz,* to make proportional in all its parts; to cause to have corresponding parts. SYM'METRIZING, imp. SYM'METRIZED, pp. *-rīzd.* SYM'METRIST, n. *-rĭst,* one who is studious of symmetry.

SYM'METRY, BILATERAL: in the animal and vegetable kingdoms, proportion more or less observable in the distribution of organs to the two sides. Throughout the animal kingdom, there is general S. in the two sides of the body. This is the case in man and in all the *Vertebarta;* but more in the external than the internal organs, the two sides of the body presenting great diversities in the circulating, digestive, and other systems. Even the external organs, though similar on the two sides, are never perfectly alike. Thus, on comparing the two hands, the veins of one are seen to differ from those of the other. In *Mollusca*, the S. of the two sides sometimes exists, and sometimes is entirely lost, one side remaining undeveloped in the growth of the animal. In *Articulata*, the S. is in general as perfect as in *Vertebrata*, and in the internal structure more so. In *Radiata*, the whole type is very different, and a very different kind of S. appears, with reference not to two sides, but to the rays into which the body divides.

In the vegetable kingdom, S. prevails more or less, but never completely, between the two sides of leaves, fronds, etc. In flowers, a S. appears in the regular distribution of sepals, petals, stamens, etc., around the centre of the flower; and even those flowers which least exhibit it when fully blown, e g., papilionaceous flowers, possess it in the early stages of the bud as perfectly as others.

SYMPATHY, n. *sĭm'pă-thĭ* [F. *sympathie*—from Gr. *sumpatheï'a*, conformity of feeling—from *sun*, together; *pathos*, suffering]: feeling corresponding to that which another feels (see below); fellow-feeling; an agreement of affections, temperaments, or inclinations which makes two persons pleased with each other; compassion; in *med.*, that influence or correspondence which arises in one part of the body from disease or irritation in another part, as the headache of indigestion, the pain in the right shoulder in disease of the liver, or the affection of one eye from disease of the other (see below): propensity of inanimate bodies to unite, or to mutual action. SYM'PATHET'IC, a. *-thĕt-ĭk*, or SYM'PATHET ICAL, a. *-ĭ-kăl*, pertaining to or acting by sympathy; susceptible of sympathy; having common feeling with one another; in *path.*, applied to the symptoms and affections which occur in parts more or less remote from the primary seat of disease. SYM'PATHET'ICALLY, ad. *-lĭ*. SYMPATHETIC INK (see INK). SYMPATHETIC NERVES, the system of nerves which are specially supplied to the viscera and blood-vessels. SYM'PATHIZE, v. *-thīz*, to have a common feeling with another; to be tender or compassionate. SYM'PATHIZING, imp.: ADJ. being affected by what another feels; tender; compassionate. SYM'PATHIZED, pp. *-thīzd*. SYM'PATHIZER, n. *-thī-zĕr*, one who feels with another.—SYN. of 'sympathy': pity; compassion; mercy; commiseration; condolence; agreement; tenderness.

SYM'PATHY: assumption by different individuals, or by different parts of the same individual, of the same or an analogous physiological or pathological state at the same time or in rapid succession. All the examples of S. included in the above definition have been divided into

three classes: (1) sympathies between different individuals; (2) sympathies affecting the mind, and, through it, the body; (3) sympathies strictly organic, therefore physical.

Examples of the *first class* are: readiness with which yawning is induced in a company, if one person begins to yawn; facility with which hysterical convulsions are induced in a female-hospital ward by a single case: fascination of prey by the serpent, apparently by the power of the eyes; similar power exerted by so-called electro-biologists and mesmerists, and by which some men can control fierce carnivora (see HYPNOTISM: ETC.). Examples of the *second class* are seen in the following cases. Certain odors—as of strawberries, mutton, cats, and other most diverse objects—induce fainting in some people; the smell of a savory dish may excite a flow of saliva in the mouth of a hungry person; the emotions of pity may produce a flow of tears. In these cases an affection of the mind is a necessary link; but why that affection of the mind should produce its peculiar effect is not explained; though it is plain that the portion of the nervous centre affected in such cases must have a direct influence on the parts in which the sympathetic phenomena appear, through commissural (or connecting) fibres, or the continuity of its gray matter with that of the centre from which its nerves immediately spring. Examples of the *third class* occur in the pain in the knee from disease of the hip-joint; pain in the right shoulder from disease of the liver; pain over the brow on taking a draught of iced water into the stomach; the various spasmodic affections connected with intestinal irritation, or the irritation of teething; the vomiting that occurs on the passage of a biliary or renal calculus, etc. All these cases may be more or less explained by known laws of the sensory and motor nerves; though in some cases the explanation is scarcely satisfactory; e.g., the pain over the brow from the ingestion of ice-cold water into the stomach may be referred to irritation of the gastric branches of the pneumo-gastric nerves communicated in the medulla oblongata to the fifth nerve; but why the irritation should be confined to the frontal branch of the first (or ophthalmic) division of the fifth nerve, we are utterly unable to explain.

SYMPHENOMENA, n. plu. *sĭm'fĕ-nŏm'ĕ-nă* [*sym*, and *phenomena*]: natural sounds or appearances of a kind or character similar to others expressed or exhibited by the same object. SYM'PHENOM'ENAL, a. *-ĕ-năl*, designating significant words imitative of natural sounds or phenomena.

SYMPHONY, n. *sĭm'fŏ-nĭ* [F. *symphonie*—from Gr. *sumphōnĭa*, harmony of sounds—from *sun*, together; *phōnē*, a sound, a tone]: consonance or harmony of mingled sounds: specially, a musical composition for a full band of instruments (see below): also the instrumental introduction or termination of vocal compositions; a ritornello. SYMPHONIC, a. *sĭm-fŏn'ĭk*, pert. to or characteristic of a symphony. SYMPHONIOUS, a. *sĭm-fō'nĭ-ŭs*, agreeing in sound; harmonious; symphonic. SYMPHONIZE, v. *sĭm'-fŏ-nīz*, in *OE.*, to agree with; to be in unison. SYM'PHO-

NIST, n. *-nĭst*, a composer of symphonies.—A *symphony*, as a composition for a full orchestra, consists of three to six movements. It is for the orchestra what a Sonata (q.v.) is for a single instrument; but generally of greater length, and its movements more fully and richly developed, the subjects introduced being worked out in broader masses. The most usual though not unvarying order of movements is a slow introduction, ushering in a brilliant allegro, followed by an adagio or andante, a minuet with its trio, a short sportive movement called a scherzo, and a lively finale. The S. is one of the highest of musical compositions, and one in which excellence is rare. Haydn, Mozart, Beethoven, and Mendelssohn, are among the few successful composers of S.; and the nine symphonies of Beethoven are generally acknowledged the greatest works of their class. The Overture (q.v.) is in form not unlike a S., but much shorter; though the terms S. and overture were at one time used almost synonymously, and several of Haydn's early symphonies are called overtures. At the present day the overture in the composer's score of an Italian opera is called *Sinfonia*.

SYMPHORICARPOUS, a. *sĭm'fŏr-ĭ-kär'pŭs* [Gr. *sun*, together; *phorèō*, I bear; *karpos*, fruit]: in *bot.*, bearing fruits clustered together.

SYMPHYSIS, n. *sĭm'fĭ-sĭs* [Gr. *sum'phŭsis*, a growing together—from *sun*, together; *phŭō*, I grow: F. *symphyse*]: in *anat.*, the union of bones by means of an intervening cartilage, so as to form an immovable joint; a healing by the first intention; the coalescence of a natural passage. SYM'PHYSEOT'OMY, n. *-sē-ŏt'ŏ-mĭ* [Gr. *tomē*, a cutting]: in *surg.*, the dividing the symphysis pubis during labor.

SYM'PHYTUM: see COMFREY.

SYMPIESOMETER, n. *sĭm'pĭ-ĕ-sŏm'ĕ-tĕr* [Gr. *sumpiĕzō*, I press together; *metron*, a measure]: a kind of barometer in which the pressure of the atmosphere, acting upon glycerine or oil, compresses an elastic gas in the upper part of the instrument, the change in the bulk of the gas being measured by a scale.

SYMPLOCE, n. *sĭm'plō-sē* [Gr. *sumplŏkē*, an interweaving—from *sun*, together; *plekō*, I twine]: in *gram.*, the beginning and ending of successive clauses with the same word.

SYMPODIUM, n. *sĭm-pō'dĭ-ŭm* [Gr. *sun*, together; *pous*, a foot, *podes*, feet]: in *anat.*, a monster fetus having its feet grown together; in *bot.*, in forked branching, when the primary axis consists of the bases of consecutive bifurcations or branchings—also called PSEUDAXIS, n. *sū-dăks ĭs* [Gr. *pseudĭs*, false, and *axis*]: a false axis; cymose inflorescence. SYMPO'DIAL, a. *-dĭ-ăl*, of or pertaining to cymose inflorescence, or to axes branching in this manner.

SYMPOSIUM, n. *sĭm-pō'zĭ-ŭm*, SYMPO'SIA, n. plu. *-zĭ-ă* [L. *sympŏsium;* Gr. *sumpŏsiŏn*, a drinking-party—from *sun*, together; *posis*, drink; *pinō*, I drink]: a drinking together; a merry feast.

SYMPTOM, n. *sĭm'tŭm* [Gr. *sumptōma*, a collapse, casualty, symptom—from *sun*, together; *ptōma*, a fall—from *piptein*, to fall: F. *symptome*]: something in concurrence with another thing; thence, a mark; a token; in *med.*, token, mark, or sign which indicates disease, and specifically the kind of disease (see SYMPTOMS). SYMPTOMATIC, a. *sĭm'tō-măt'ĭk*, or SYMP'TOMAT'ICAL, a. *-măt'ĭ-kăl*, indicating the existence of something else; happening in concurrence with something. SYMP'TOMAT'ICALLY, ad. *-kăl-lĭ*. SYMPTOMATIC DISEASE, a disease which is dependent upon, or which is a symptom of, some other disease, as dropsy following disease of the heart. SYMP'TOMATOL'OGY, n *-tŭm-ă-tŏl'ŏ-jĭ* [Gr. *logos*, a discourse]: the doctrine of symptoms; the part of medicine which treats of symptoms.—SYN. of 'symptom': indication; token; mark; sign; note.

SYMP'TOMS, in Medicine: morbid phenomena by which the physician becomes aware that derangements of some kind have taken place in the economy: a mental effort is requisite to convert these symptoms into signs of disease. A symptom thus converted into a sign of some special disorder tends to constitute the *diagnosis*, or recognition of the disease. The interpretation of S. requires close, often repeated, observation of the patient, with investigation which may connect the results arrived at with his constitution and previous history. It requires logical acumen. The individual value of each symptom ought to be duly weighed; one sympton must be compared with the others; while the liability to variation of a similar symptom in different cases of a like kind must not be forgotten. Many writers, following Laennec, confine the term *symptom* to the phenomena depending on vital properties; while those phenomena of disease more directly physical they call *signs:* thus there are what may be called *physical signs* and *vital symptoms*. The form, size, color, firmness or softness, heat and odor of a part of the body, the sounds which it yields on percussion or auscultation, etc., afford *physical signs;* while *vital symptoms* may be exemplified in pain, uneasiness, altered or impaired sensations, spasm, vomiting, the accelerated pulse and hot skin of fever, the state of the tongue and of the alvine and urinary excretions, etc. The term *semeiology* (literally, *theory of signs*) has been given by medical writers to the general study of this subject: see Williams's *Principles of Medicine*.

SYN-, *sĭn* [Gr. *sun*, with, together]: a Greek prefix signifying 'with;' together; united—as in *syn*tax: *syn* assumes the various forms of SY, SYL, or SYM, according to the letter which begins the other part of the word—becoming *sy* before *s*, as in *sy*stem; *syl* before *l*, as in *syl*lable; *sym* before *p*, *b*, *ph*, as in *sym*pathy, *sym*bol, *sym*phony.

SYNACME, n. *sĭn-ăk'mē*, or SYNAC'MY, n. *-mĭ* [Gr. *sunakmazō*, I flourish at the same time with another—from *sun*, together; *akmē*, bloom, prime]: in *bot.*, the condition of stamens and pistils when they reach maturity at the same time. SYNAC'MIC, a. *-mĭk*, characterized by synacmy, as the plant *Solānum dulcamāra*, the woody nightshade.

SYNÆRESIS, n. *sĭn-ē'rĕ-sĭs*, or SYNERESIS, n. *sĭn-ĕr'-ĕ-sĭs* [Gr. *sunaï'rĕsis*, a taking or drawing together—from *sun*, together; *haï'rĕō*, I take or seize]: in *gram.*, a figure by which two vowels, usually separated, are drawn together into one syllable, as *o'er* for *over*; the opposite of *diæresis*.

SYNAGOGUE, n. *sĭn'ă-gŏg* [F. *synagogue*—from Gr *sunagōgē*, an assembly—from *sun*, together; *agō*, I lead]: among the *Jews*, a congregation for worship, or for religious rites; place of worship. SYN'AGOG'ICAL, a. *-gŏj'ĭ-kăl*, pert. to. SYN'AGOG'ICALLY, ad. *-lĭ.*—*Synagogue* signifies both a local assembly of Jewish worshippers and the place of their worship. The origin of this institution is probably traceable to the period of the Babylonian captivity (see Is. viii. 16, etc.), though tradition finds it in the patriarchal times. When, at the time of Ezra, and chiefly through Ezra's instrumentality, the ancient order of things was re-established in Judea, synagogues were established in all the towns for common prayer, and primarily for the popular religious instruction of those who could not take part oftener than three times a year, or not even so often, in the altar ritual of the temple at Jerusalem; and for these local congregations a special ritual of lectures and prayers was instituted. From the time of the Maccabees, we find them even in all the villages; and Josephus, Philo, the New Testament, the Mishna, and the Talmud, constantly allude to them. In times post-Talmudic it was a rule that wherever 10 Jews resided a S. should be built. For their antiquity, see Ps. lxxiv. 8; Acts xv. 21. The Sabbaths and feast-days were the principal times of assemblage; and the synagogues contributed more than anything else to the steadfast adherence of the people to their religion and nationality. At the same time they gradually undermined the priestly, ritualistic, and aristocratic element that gathered round the temple, its gorgeous worship and kingly revenues. Little is known of special laws respecting the construction of these buildings, except that the faces of the worshippers should be directed toward Jerusalem (*misrach* = eastward) (see MOSQUE); or that, in accordance with a verse in the Psalms, there should be a slight descent of a step or two on entering a S., or that it should stand, if feasible, on slightly elevated ground, or be in some way made visible afar. Erected out of the common funds or free gifts of the community, it had also to be supported by taxes and donations. All profane doings were strictly prohibited in it: no eating, drinking, reckoning, and the like, were allowed; and even as to dress and general decorum, the reverence due to the place was enforced. It represented in miniature the form of the

temple, itself an enlarged type of the earlier tabernacle. At the extreme e. end was the *Aron hakkodesh*, the holy ark, containing several copies of the Pentateuch, from which the periodical readings were chanted. In front of this was the stand of the public reader of the prayers, not far from which was suspended the perpetual lamp (*ner tamid*). On a raised platform in the middle of the S. was the place of the reader or preacher. The women sat separated from the men by a low partition five or six ft. high. The affairs of the S. were administered by a senate of 'ancients' or 'elders,' with a chief or principal (*Rosh hakkeneseth* = *archisynagogos*): this college managed the inner affairs of the synagogue; called on fit persons to read, pray, or preach; and had the power of excommunication: see Lk. xiii. 14; Acts xiii. 15. The officiating minister, whose office it was to recite the prayers aloud, was called *sheliach tzibbur*—messenger of the community (*angelos ecclesias*, Rev.): his qualifications were, among others, to be active, to be father of a family, not to be rich nor engaged in business, to possess a good voice, to be apt to teach, etc. The *chazzan* (beadle) had general charge of the sacred place, and its books and implements: he had to present the scroll to the reader, and assist on other occasions: during the week-days he had to teach the children of the town or village. He too had to be initiated by a solemn imposition of hands. This name chazzan, however, later came to designate the officiating minister, and it has retained that meaning till this day. Other officials were almoners or deacons, who collected and distributed the alms, and had always to be ready to make up the requisite number of *ten* worshippers. For the prayers used, see LITURGY, JEWISH. The third, sixth, and ninth hours of the day were appointed for a daily worship; but the special days, besides the Sabbaths and feast days, were Monday and Thursday, when the judges sat, and the villagers came to town. At the principal service on the Sabbath morning, lessons were read from the law and the prophets, prayer was offered, a sermon based on the lesson was preached, and a blessing pronounced.

As to the connection between the Jewish S. and the Christian Church, and their respective modes of worship, it is obvious that the principal practices of the church belong, with certain modifications, to the S.; and it has been conjectured that even the melodies of certain hymns still sung in the Roman churches are traceable to the temple and the S. It is, moreover, well known that the early Christian churches were entirely organized after the pattern of the synagogues. As to the judicial power exercised by the officers of the S., see SANHEDRIM. They had, there can hardly be a doubt, a kind of authority with regard to religious transgressions; but how far this extended is not known. Modern synagogues differ only in some minor points—additional prayers and the like—from what we gather to have been the mode in use at the time of Christ, except that there are no more elders, but a simple board elected from the community, without authority beyond

that of, perhaps, a board of trustees, and that the chazzan, as above said, has now the functions of the 'sheliach.' The languages used in the early synagogues of Palestine and Alexandria were Hebrew, Aramaic, and Greek respectively.—See JEWS: JEWISH SECTS: LITURGY, JEWISH: ETC.

SYN'AGOGUE, THE GREAT [Heb. *keneseth haggedolah*]: in Jewish tradition, an assembly or synod, supposed to have been founded and presided over by Ezra, consisting of 120 men, said to have been engaged in remodelling the national and religious institutions of the Jews after the return from Babylon, and to have held in continuance the supreme religious authority for about 125 years after the cessation of the prophetic line. Since about the 12th c., the rabbinical and the modern Prot. view has been that the Old Test. canon was finally fixed by this body. This Great S., however, is traditional rather than historical. The first record of it is not earlier than the 2d Christian c.; neither Philo nor Josephus mentions it. Palpable chronological discrepancies occur in the early accounts. For these reasons, some modern scholars (Richard Simon, Jacob Alting, Rau, J. D. Michaelis, De Wette, and others —notably Kuenen) have denied the existence of such a continuous synod; and have declared that the term referred merely to the great convocation noted in Neh. viii. 10. Other scholars (Eichhorn, Bertholdt, Ewald, etc.) claim for the tradition some foundation of fact. Certainly, Ezra, contemporary of Artaxerxes, can never have taken his place in it together with Zerubbabel and Joshua, who left Babylon under Cyrus, or with Simeon the Just, who lived at the time of Alexander the Great. The tradition probably never meant anything else than that the institution founded by Ezra, and which lasted till the time of Alexander, comprised 120 men, of whom Simeon was one of the last. There is no reason to doubt that Ezra and Nehemiah did a certain amount of regulative and codifying work which they could not have done without the aid of eminent collaborators—such as ameliorating the administration of justice; developing public instruction; fixing and enlarging the Mosaic laws by certain rules of interpretation; and collecting, purifying, and redacting the sacred books as much as in them lay. There is little reason to believe that they introduced the vowel-points, which have been handed down to us by the Masoretes, instituted the feast of Purim, and sanctioned the Eighteen Benedictions (see LITURGY, JEWISH). Whatever of fact may be borne on the tide of Jewish tradition concerning the Great S., the body certainly disappeared before the Sanhedrim (q.v.) was instituted.

SYNALEPHA, n., or SYNALŒPHA, n. *sĭn'ă-lē'fă* [Gr. *sunaloi'phē*, a melting together—from *sun*, together; *alei'phō*, I anoint, I besmear]: in *gram.*, the process of cutting off or suppressing a vowel at the end of a word, when the next word begins with a vowel.

SYNANDRÆ, n. plu. *sĭn-ăn'drē* [Gr. *sun*, together; *anēr*, a male, *andros*, of a male]: in *bot.*, a division of gamopetalous dicotyledons, having the carpels unequal in number to the parts of the other whorls, while the stamens are synantherous.

SYNANTHEROUS, a. *sĭn-ăn'thĕr-ŭs* [Gr. *sun*, together; *anthēros*, flowery, blooming—from *anthos*, a flower]: in *bot.*, having the stamens united by their anthers so as to form a tube round the style. SYNAN'THERÆ: see COMPOSITÆ.

SYNANTHOUS, a. *sĭn-ăn'thŭs* [Gr. *sun*, together; *anthos*, a flower]: in *bot.*, having flowers united together. SYNANTHY, n. *sĭn-ăn'thĭ*, the adhesion of several flowers.

SYNAPTASE, n. *sĭn'ăp-tāz* [Gr. *sunaptos*, joined, united—from *sun*, together; *haptō*, I connect or tie to]: nitrogenous compound, found in certain oily seeds, as in almonds (see EMULSION). SYNAPTICULÆ, n. plu. *sĭn'ăp-tĭk'-ū-lē* [dim.]: transverse props, sometimes found in corals, extending across the loculi like the bars of a grate.

SYNARTHROSIS, n. *sĭn'ăr-thrō'sĭs* [Gr. *sunarthrōsis*, a being joined together—from *sun*, together; *arthron*, a joint]: in *anat.*, a union of bones without motion. SYNARTHRO'DIAL, a. *-dĭ-ăl*, pertaining to or resembling synarthrosis.

SYNCARPIUM, n. *sĭn-kär'pĭ-ŭm* [Gr. *sun*, together; *karpos*, fruit]: in *bot.*, an aggregate fruit having the carpels of a multiple ovary formed into a solid mass, with a slender receptacle. SYNCARPOUS, a. *sĭn-kär'pŭs*, having the carpels united so as to form one ovary or pistil. SYNCARPY, n. *sĭn'kär-pĭ*, the accidental adhesion of several fruits, forming an abnormal condition.

SYNCATEGOREMATIC, n. *sĭn-kăt'ĕ-gŏr-ĕ-măt'ĭk* [Gr. *sun*, with; *katēgōrēma*, a predicate]: in *logic*, a word which cannot of itself be used as a term—e.g., an adverb, a preposition, etc.

SYNCHONDROSIS, n. *sĭn'kŏn-drō'sĭs* [Gr. *sun*, together; *chondros*, a cartilage]: in *anat.*, the connection of bones by means of cartilage or gristle.

SYNCHRONAL, a. *sĭn'krō-năl*, or SYN'CHRONOUS, a. *-nŭs* [Gr. *sun*, with; *chronos*, time]: happening at the same time; of the same date or epoch; simultaneous. SYN'CHRONAL, n. that which happens at the same time with something else. SYN'CHRONOUSLY, ad. *-lĭ*. SYNCHRONIC, a. *sĭn-krŏn'ĭk*, or SYNCHRON'ICAL, a. *-ĭ-kăl*, same meaning as *synchronal*. SYNCHRON'ICALLY, ad. *-lĭ*. SYNCHRONIZE, v. *sĭn'krō-nīz*, to agree in time; to be simultaneous; to make to agree in time. SYN'CHRONIZING, imp. SYN'CHRONIZED, pp. *-nīzd*. SYNCHRONIZATION, n. *sĭn'krō-nĭ-zā'shŭn*, concurrence of events. SYN'CHRONISM, n. *-nĭzm*, a happening at the same time; simultaneousness; in *hist.*, the tabular arrangement in one view of contemporary persons, things, and events, according to dates.

SYNCHYSIS, n. *sĭng'kĭ-sĭs* [Gr. *sungchusis*—from *sun*, together, with; *chusis*, a pouring; *cheō*, I pour]: in *path.*, confusion of the humors of the eye, generally produced by a violent blow, or from inflammation of the uvea, also an effect of violent ophthalmia: in *rhet.*, confused arrangement of words which obscures the sense.

SYNCLINAL, a. *sĭn-klī'năl* [Gr. *sun*, together; *klinō*, I lean or bend]: in *geol.*, applied to strata that dip from opposite directions inward, like the leaves of a half-opened book, or which incline to a common centre, forming a trough or basin-shaped hollow. SYNCLINAL AXIS, the line of curve in which such a trough or basin-shaped hollow trends. ANTICLINAL LINE, or ANTICLINAL AXIS, the wave-line or ridge-curve of direction of strata which dip in opposite directions from a common ridge, like the roof of a house.—See SYNCLINORIUM.

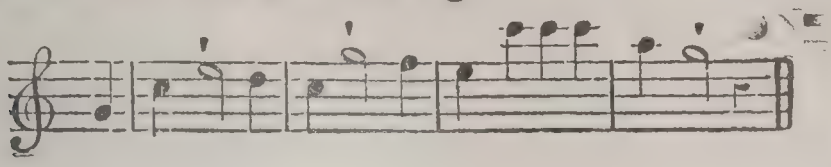
SYNCLINORIUM, n. *sĭng-klĭ-nō'rĭ-ŭm* [Gr. *sún*, together; *klínein*, to incline; *oros*, mountain]: mountain or range consisting of strata inclined together—i.e., curving downward toward a central axis. Synclinal has long been in use to denote such strata; and synclinorium (plural synclinoria), as well as the opposite, anticlinorium, was happily introduced by Prof. J. D. Dana to indicate the kind of mountain structure. The principal mountain ranges of the earth are synclinoria, and necessarily so; because, first, a curve of strata upward, if high and abrupt, would produce a broken mass rapidly reduced by atmospheric agencies, aided by gravitation acting on broken strata that incline with the slope; whereas synclinal strata, piercing the mountain transversely to the slope, strengthen the mass and resist degradation, much in the same way that an artificial terrace of earth is often upheld against the loosening influence of rain by planks and stakes set transversely to the slope. Secondly, the process by which great mountain ranges were formed necessitated for the most part a general synclinal structure. The most rational theory is that the continents were from the first the comparatively stable portions of the crust; and as the crust shrank by internal cooling, the more yielding areas of the oceans were depressed. This would produce a bulging on the continental borders, as a hoop of stout wire pressed in on one side must necessarily project on either side of the depressed part. There is evidence of such an anticlinal sea-border formerly, outside of our present coast; and the bulging produced a corresponding depression along the area now occupied by the Appalachian ranges. This alone, however, might not have created the great trough, which was the first stage of mountain-making. It should be remembered that the sinking crust beneath the sea *hinged* on to the stable continent; hence on the border there would be displacement, or yielding, under the great tension of the shrinking crust and the lateral thrust against the continent from the subsiding sea-area, as illustrated by the depressed circle of wire. Howsoever forces might combine, it is plain that a trough was first in formation, for the deposits of material, forming strata, are immensely thick in

every great mountain range—40,000 ft. in the Alleghanies against 3,000—5,000 elsewhere. This subsiding mass, continually filling in, was at length brought in its lower portions to a depth where it was weakened, if not fused, by the internal heat of the earth; and the result was that the whole collapsed, was pressed together, resulting not only in many parallel billowy ranges (dying away toward the interior of the country) but in a piling up of the vast mass of material, forced into a narrower space, and hence rising into Alleghanies, Alps, and Himalayas, somewhat as, on a small scale, colliding railway-trains or flood-wood logs are piled up high. In general the collapse was the forcing upward of the great filled trough; and any incidental anticlinals would be broken up and worn away, leaving the salient ranges in the form of synclinals. The crises were of different ages: the Blue Ridge at the close of Archæan time; the Green Mts. at the end of the Silurian; the Alleghanies at the termination of the Carboniferous. The Rocky Mts. were finally lifted to their present full height in the Tertiary and afterward, by a *geanticlinal* (a vast upbending of the crust, in this case a thousand miles wide) at a time when the rigid mass was ruptured only here and there, emitting great outpourings of igneous rock (forming the 'mesas'), instead of being crushed together. Compared with the great ranges facing oceans, the Catskills, where the strata lie as deposited, except somewhat tilted, are inconsiderable exceptions. Such mountains are effects of circumdenudation, the surrounding deposits having been worn away and carried off, probably to a considerable extent before consolidation.

The theory of lateral thrust from subsiding sea-beds, against continental borders, is confirmed by the parallel ranges, constituting mountain systems. These are highest opposite the largest and deepest oceans; the ranges, also, nearest the ocean (excluding the minor 'coast ranges') are highest, the more interior successively less lofty and bold (see MOUNTAINS, figure); and the slope of each range is steepest toward the sea.—These are the general facts, with some exceptions that may be referred to interfering or subsequently acting causes. A table-cloth of sufficient thickness will show miniature ranges with these peculiarities when pushed by a hand pressing on the table.

SYNCOPE, n. *sin'kŏ-pē* [Gr. *sungkŏpē*, a cutting off, a shortening—from *sun*, together; *koptō*, I cut off]: in *gram.*, a throwing out of one or more letters from the middle of a word, as *ne'er* for *never*, *e'en* for *even:* in *med.*, a fainting or swooning by the interruption of the action of the heart (see FAINTING): in *music*, same as *Syncopation* (q.v.). SYN'COPATE, v. *-pāt*, to contract a word by syncope: in *music*, to begin, as a note, on the unaccented part of a measure, and end on the accented. SYN'COPATING, imp. SYN'COPATED, pp. SYN'COPA'TION, n. *-pā'shŭn*, the contraction of a word by suppressing one or more letters in the middle: in *music*, act of syncopating; performance of a passage by syncopating the notes. Notes which begin on the unaccented part of a measure, and end on the accented,

are called syncopated or driving notes: their effect is to invert the rhythm, and lay an emphasis on the usually unaccented part of the measure, e.g.:



SYN'COPIST, n. *-pĭst*, one who contracts words by syncope.

SYNCRETISM, n. *sĭn'krē-tĭzm*, or SYN'CRATISM, n. *-krā-tĭzm* [Gr. *sungkrētismos*, union against a common enemy—from *sun*, with; *krētizō*, to behave like Cretans, i.e., to sink their differences and combine against a common enemy]: the attempt to blend the tenets of different schools of philosophy or sects of religion into one system in order to produce union and concord. SYN'CRETISTS, n. plu. *-tĭsts*, specially, followers of Calixtus, Lutheran divine, who attempted in the 17th c. to promote concord among Christians of all sects, Prot. as well as Rom. Cath. (see CALIXTUS, GEORG): also, certain followers of the Platonic philosophy in the 15th c. SYNCRETIC, a. *sĭn-krĕt'ĭk*, blending parties or tenets. SYNCRETISTIC, a. *sĭn'krē-tĭs'tĭk*, pertaining to syncretism.

SYNCRISIS, n. *sĭng'krĭ-sĭs* [Gr., a comparison—from *sun*, together, with; *krisis*, a judging; *krinō*, I judge]: in *rhet.*, a figure by which opposite persons or things are compared.

SYNDESMOSIS, n. *sĭn'dĕz-mō'sĭs* [Gr. *sun*, together; *desmos*, a bond—from *deō*, I bind]: in *anat.*, the union of one bone with another by ligaments.

SYNDIC, n. *sĭn'dĭk* [Gr. *sundĭkŏs*, helping in a court of justice, an advocate—from *sun*, together; *dikē*, justice: F. *syndic*]: officer invested with different powers in different countries: one chosen to transact business for others. In Geneva the chief magistrate was formerly called the S. The syndics of cities in France, under the old régime, were officers delegated by the municipality as agents or mandatories; the various trading companies in Paris and the university had their syndics; and in the Univ. of Cambridge, syndics are members of special committees of members of the senate, appointed by grace from time to time for specific duties (see UNIVERSITY). SYN'DICATE, n. *-dĭ-kāt*, the office or jurisdiction of a syndic; a council or body of syndics: a combination of capitalists to promote a particular financial scheme, e.g., a foreign loan, a public company, etc.: V. in *OE.*, to judge or censure.

SYNECDOCHE, n. *sĭn-ĕk'dŏ-kē* [Gr. *sunek'dŏchē*, the understanding one thing with another—from *sunekdeck'-ŏmai*, I join in receiving—from *sun*, together; *ek*, out; *dech'ŏmai*, I receive]: in *rhet.*, a figure in which the whole is put for a part, or a part for the whole; e.g., a door for a house, a sword for all weapons of war. SYNECDOCHICAL, a. *sĭn'ĕk-dŏk'ĭ-kăl*, expressed by synecdoche, or implying one. SYN'ECDOCH'ICALLY, ad. *-lĭ*.

SYNECHIA, n. *sĭn-ĕ-kī'ă* [Gr. *sunĕcheïa*, a holding together—from *sun*, with; *ĕchō*, I have, I hold]: in *med.*, a disease of the eye in which the iris adheres to the cornea, or to the capsule of the crystalline lens.

SYNERESIS: for SYNÆRESIS, which see.

SYNERGIDÆ, n. plu. *sĭn-ĕr'jĭ-dē* [Gr. *sun*, with; *ergon*, work]: in *bot.*, certain accessory cells which occur in the developing embryo-sac of flowering plants.

SYNERGIST, n. *sĭn-ĕr'jĭst* [Gr. *sun*, together; *ergon*, work]: one of a party in the Lutheran Church who propagated about the end of the 16th c. the doctrine that 'grace communicated to adult persons so as to draw them to God required a corresponding action of their own free will in order to become effectual.' SYN'ERGIS'TIC, a. *-tĭk*, or SYN'ERGIS'TICAL, a. *-tĭ-kăl*, pertaining to the synergists; acting or working together; co-operating. SYNER'GISM, n. *-jĭzm*, the doctrine of the synergists—that in the work of conversion the will of man is not wholly passive, but can co-operate, through consent, with the Divine Spirit. About 1557 the question was hotly discussed by the Prot. theologians Pfeffinger, Flacius, and Strigel, and soon the whole theological world was wrangling over the point. The Wittenberg divines were in favor of, the Mansfeld divines against, synergism. Finally, the *Concordien formel*, in its third article, condemned it.

SYNESIUS, *sī-nē'shĭ-ŭs:* bishop of Ptolemais in Libya; b. near the beginning of the last quarter of the 4th c.; d. prob. 414. In 393 he became a pupil of Hypatia in Alexandria. Returning home 397, he was 3 yrs. at Constantinople at the head of an embassy seeking abatement of taxes, awaiting audience with the emperor, before whom he made an oration that is still preserved. From 400 to 410 he was mostly on his rural estate, visiting Athens 402. Chosen bishop, he stipulated that he should be free to dissent on questions of the soul's creation, a literal bodily resurrection, and the final destruction of the world. He excommunicated a prefect for interfering with the church's right of asylum. Of his writings are preserved *Dio, sive de suo ipsius Institute; Encomium Calvitii* (Praise of Baldness); *De Providentia; De Insomniis;* also 157 Epistles and 12 Hymns.

SYNGENESIAN, n. *sĭn'jĕ-nē'zhĭ-ăn*, or SYN'GENESIOUS, a. *-ŭs* [Gr. *sun*, with; *genĕsis*, generation, birth]: in *bot.*, having the stamens united in a cylindrical form by the anthers, as in the ord. *Compositæ* (q.v.).

SYNGNA'THIDÆ: see PIPE-FISH.

SYNOCREATE, a. *sĭn-ŏk'rē-āt* [Gr. *sun*, with; L. *ocrĕātus*, furnished with greaves or leggings; *ocrĕa*, a greave]: in *bot.*, having stipules uniting together on the opposite side of the axis from the leaf.

SYNOD, n. *sĭn'ŏd* [Gr. *sunŏdŏs*, a meeting—from *sun*, with; *hodos*, a way, a coming: F. *synode*]: ecclesiastical convention; a council (see below). SYN'ODAL, a. *-ŏ-dăl*, pert. to a synod: N. money anciently paid to the bishop at the Easter visitation. SYNODIC, a. *sĭn-ŏd'ĭk*, or SYNOD'ICAL, a. *-ĭ-kăl*, pert. to or transacted in a synod: pert. to the period which elapses between a planet's appearance at one of the nodes of its orbit and its return to the same node: see NODES: MONTH. SYNOD'ICALLY, ad. *-lĭ*.—*Synod* in general signifies a meeting, but is almost exclusively applied to ecclesiastical assemblies usually for deciding, sometimes for only deliberating, on doctrinal or disciplinary subjects. In church law, several kinds of synods—called also councils are enumerated: (1) ecumenical or general, of the entire church; (2) national—the church of an entire nation; (3) provincial—the church of a province; (4) diocesan, the church of a single diocese.—(See COUNCIL—several titles.)—By the law of the Rom. Cath. Church, the decrees of a national or provincial S. are submitted to the pope's decision. A diocesan S. is convened by the bp., and consists of the members of the chapter, the beneficed clergy having the permanent care of souls, and the heads of the communities of regular clergy.—Synods of the English Church are held only by authority of the crown. A Presb. synod consists of only the ministers and elders of adjoining presbyteries within a particular district, generally one elder for each congregation: it is subordinate to the general assembly, when there is a general assembly.

SYNOD, GENERAL, of the Evangelical Lutheran Church in North America: see LUTHERAN CHURCH, EVANGELICAL.

SYNŒCIOUS, a. *sĭn-ē'shŭs* [Gr. *sun*, together; *oikos*, a house]: in *bot.*, having antheridia and archegonia on the same receptacle.

SYNONYM, n., or SYNONYME, n. *sĭn'ō-nĭm* [Gr. *sunōnŭmos*, having the same name or meaning—from *sun*, together; *ŏnŏma*, a name]: word having the same, or nearly the same, signification as another word in the same language, and which may be interchanged with it without altering the meaning of the context: in general, a word used in the wide sense to indicate a similar sense to another word; or one having something in common with another, though not identical; plurals, SYN'ONYMS and SYN'ONYMES, *-nĭmz*, or SYNONYMA, *sĭn-ŏn'ĭ-mă*. SYN'ONYM'ICON, n. *-ĭ-kŏn*, a book of synonyms. SYNON'YMIZE, v. *-mīz*, to express the same meaning in different words. SYNON'YMIZING, imp. SYNON'YMIZED, pp. *-mīzd*. SYNON'YMIST, n. *-mĭst*, one who collects and explains synonyms. SYNON'YMOUS, a. *-mŭs*, having the same meaning; expressing the same thing. SYNON'YMOUSLY, ad. *-lĭ*. SYNON'YMY, n. *-mĭ*, the quality of being synonymous; a figure by which synonymous words are used to amplify a discourse.—*Synonym* has sometimes a loose, but usually a restricted application. When any one of several words will serve to name or express the same thing, that thing is said to be *polyonymous*, or many-named; and the words are called *synonyms*: in this wide sense, *man*, *soldier*, *captain*, *general*, *Frenchman*, might be called syno-

nyms, as they all can be applied to denote the same individual—e.g., Napoleon: see NOUN. But S. is commonly applied in a restricted sense to words having substantially the same meaning, with only slight shades of difference—e.g, *observe* and *remark*. In a settled and matured language, no two words can have exactly the same meaning; in such a case, one would be superfluous, and would be gradually dropped. Many words originally identical in application, have become differentiated by usage, each being appropriated to a special variety of the general notion.

The English language abounds in pairs of synonyms like *sharp* and *acute*, of which one is Anglo-Saxon, the other borrowed from the Latin. It would be difficult to find a case of more exact correspondence of sense than *acutus* in Latin, and *sharp* (Ger. *scharf*) in Teutonic; but *acute* in English has become nearly confined to the metaphorical sense of sharpness of the intellect or of the senses, one of the few cases of its retaining the primary, physical signification being in the technical phrase an 'acute angle.' *Sharp* is applied both in the physical sense and in the metaphorical; but metaphorical *sharpness* is not exactly the same thing as *acuteness*. A 'sharp' lad is one quick in apprehension and movement; an 'acute' intellect is one having great power of penetration and discrimination; while in a lawyer or financier of 'sharp' practice a reprehensible moral quality is implied.

SYNOPSIS, n. *sĭn-ŏp'sĭs* [Gr. *sunop'sis*, the act of viewing at a glance—from *sun*, together; *opsis*, a view]: a general view; a collective view of any subject in a condensed form. SYNOP'SES, plu. *-sēz*. SYNOP'TIC, a. *-tĭk*, or SYNOP'TICAL, a. *-tĭ-kăl*, affording a general view; exhibiting the principal parts at one view, or in a condensed form, as the synoptic gospels of Saints Matthew, Mark, and Luke exhibit the life of Christ. SYNOP'TICALLY, ad. *-lĭ*.—SYN. of 'synopsis': abridgment; compendium; abstract; epitome.

SYNOSTEOSIS, n. *sĭn-ŏs'tē-ō-sĭs* [Gr. *sun*, together; *ŏstĕŏn*, a bone]: in *anat.*, the premature obliteration of certain of the sutures of the skull. SYN'OSTEOT'IC, a. *-stĕ-ŏt'ĭk*, having the character of synosteosis.

SYNOVIA, n. *sĭn-ō'vĭ-ă* [Gr. *sun*, with; L. *ovum;* Gr. *ōŏn*, an egg]: a fluid secreted in the cavity of joints for the purpose of keeping them moist. SYNO'VIAL, a. *-ăl*, pertaining to or secreting synovia. SYNOVITIS, n. *sĭn'ō-vī'tĭs* [*itis*, denoting inflammation]: inflammation of the synovial membrane.

SYNO'VIAL MEMBRANES AND FLUID: membranes lining the joints, and the fluid which these membranes secrete. In every joint in which considerable range of motion is required, the osseous segments (or contiguous extremities of bones) are separated by a space, called the cavity of the joint. The end of each of the bones entering into the composition of the joint is incrusted by a layer of articular cartilage adapted to its form; and the entire cavity is lined by a delicate membrane which secretes

a peculiar viscid matter, termed *synovia*, or *synovial fluid*, for lubricating the inner surface. In its microscopical characters, a synovial membrane closely resembles a Serous Membrane (q.v.), though there are certain points of difference. Like a serous membrane, a synovial membrane is always a closed bag, like the pleuræ, e.g., with an attached and a free surface, the latter smooth and moist. A very simple form of synovial membrane—anatomically known as a *bursa*—serves to facilitate the gliding of a tendon of a muscle or of the integument over a projection of bone: it consists of a bag connected by areolar tissue with the neighboring parts, and secreting a fluid in its interior. These bags are sometimes prolonged into *synovial sheaths*, which surround long tendons, such as those of the flexor and extensor muscles of the fingers and toes. In deep-seated Whitlow (q.v.), when inflammation extends to one of the sheaths, and occasions formation of adhesions, the motion of the inclosed tendon is destroyed, and a permanently stiff finger is the result.

The *synovial fluid*, or *synovia*, derives its name from its resemblance to the white of an egg: it consists of water, holding in solution mucin, albumen, extractive matters, fat, and inorganic salts. The analyses of Frerichs show that the composition and quality of the synovia vary essentially according as an animal is at rest or leads a wandering life.

SYNSEPALOUS, a. *sĭn-sĕp'ă-lŭs* [Gr. *sun*, with; Eng. *sepal*]: in *bot.*, having the sepals all united by their edges; same as *gamo-* or *mono-sepalous*.

SYNSPERMOUS, a. *sĭn-spĕr'mŭs* [Gr. *sun*, with; *sperma*, seed]: in *bot.*, having several seeds united. SYNSPERMY, n. *sĭn'spĕr-mĭ*, the union of several seeds.

SYNSPOROUS, a. *sĭn-spō'rŭs* [Gr. *sun*, together; *spora*, a seed]: propagating by conjugation of cells, as in algæ.

SYN'TAX, n. *sĭn'tăks*, or SYNTAXIS, n. *sĭn-tăks'ĭs* [Gr. *suntaxis*, arranging or placing together—from *sun*, with; *tassō*, I put in order]: in *gram.*, proper arrangement of words under established rules and according to the best usage in order to express ideas; the grammatical construction of sentences. The first step is the analysis of sentences—the study of their anatomy and physiology, as it were (see SENTENCE). A clear perception of the mutual relations of the several members of a sentence makes the usual rules of syntax appear self-evident truths, and in most cases superfluous. Most of these rules fall under the heads of (1) Concord and Government; (2) Order of Words, or Collocation. SYNTACTICAL, a. *sĭn-tăk'tĭ-kăl*, or SYNTAC'TIC, a. *-tĭk*, pertaining to syntax, or according to its rules. SYNTAC'TICALLY, ad. *-lĭ*.

SYNTERESIS, n. *sĭn'tĕ-rē'sĭs* [Gr. *suntēresis*, a watching closely—from *sun*, with; *tēreō*, I watch]: in *med.*, preservative or preventive treatment; prophylaxis: in *metaph.*, conscience viewed as the internal repository of the laws of right. SYN'TERET'IC, a. *-ĭk*, tending to preserve health; prophylactic. SYN'TERET'ICS, n. plu. *-ĭks*, that department of medicine which relates to the preservation of health.

SYNTEXIS, n. *sĭn-tĕks'ĭs* [Gr. *suntēxis*, decay, consumption—from *sun*, with; *tēkō*, I melt]: a wasting of the body as from consumption. SYNTEC'TIC, a. *-tĭk tĭk*, or SYNTEC-TICAL, a. *-tĭ-kăl*, pertaining to syntexis; wasting with consumption.

SYNTHERMAL, a. *sĭn-thĕr'măl* [Gr. *sun*, with; *thermē*, heat]: having the same degree of heat.

SYNTHESIS, n. *sĭn'thĕ-sĭs* [Gr. *sunthĕsis*, a putting or placing together—from *sun*, together; *thesis*, a placing; *tithēmi*, I place]: the uniting of elements to form a compound (see SYNTHESIS, in Chemistry): in reasoning, the opposite of *analysis;* the putting of two or more things together to form a whole: in *surg.*, operation by which divided parts are reunited. SYN'THESIZE, v. *-thĕ-sīz*, to combine two or more things into one. SYNTHETIC, a. *sĭn-thĕt'ĭk*, or SYNTHET'ICAL, a. *-ĭ-kăl*, pertaining to synthesis; compounding. SYNTHET'ICALLY, ad. *-lĭ*.

SYN'THESIS, in Chemistry: the building up of a more or less complicated product from its elementary constituents. As the S. of inorganic compounds is usually very simple, this article presents that of organic compounds. To take a very common substance as illustration, there is no difficulty in resolving sugar into its ultimate elements, i.e., in ascertaining its composition by analysis. If we heat a little sugar to redness in a glass tube, it leaves a black deposit, which is carbon, while a liquid, which is water, distils over; and on electrolyzing this liquid, we resolve it into hydrogen and oxygen; so that we can thus show that sugar is composed of the ultimate elements, carbon, hydrogen, and oxygen. An analysis of this kind shows that sugar may be represented by the formula $C_{12}H_{22}O_{11}$, and that one atom, or any given weight of it, contains 144 atoms or parts by weight of carbon, 22 of hydrogen, and 176 of oxygen. This pulling to pieces of the sugar is an easy matter, and has been known to chemists for nearly a century, but the putting together of the pieces, i.e., the S. of sugar, is very much more difficult. We may bring together carbon, hydrogen, and oxygen in the due proportions, and may shake them all together, or heat them, or cool them, and yet we shall never get them to combine so as to form sugar. Ethyl alcohol consists of 2 parts of carbon, 6 parts of hydrogen, and 1 part of oxygen; but no alcohol ever results from making such a mixture. Neither sugar nor alcohol can exist at the temperature to which it is requisite to raise our mixture of carbon, hydrogen, and oxygen, in order to get chemical action to set in. At ordinary temperatures, the organic elements will not enter into combination; at high temperatures they combine

indeed, but yield comparatively few compounds. There was a general belief that organic products, such as sugar, alcohol, urea, oxalic acid, taurin, leucine, etc., required for their production a mysterious so-called *vital force*, totally distinct from the ordinary forces acting on matter. The first blow to this now obsolete doctrine was struck by Wöhler 1828, when he discovered that the organic base *urea* might be artificially obtained: see ORGANIC COMPOUNDS. Three years afterward, Pelouze obtained *formic acid* from inorganic materials. In 1845, Kolbe, by a complicated process, effected the synthesis of *acetic acid*, consequently, indirectly, of its derivatives, among which are *acetone*, product of the destructive distillation of acetates; *marsh gas*, obtained by distilling an acetate with a caustic alkali; and *ethylene;* and the electrolysis of acetic acid, which Kolbe accomplished a few years afterward, yielded methyl and oxide of methyl, which latter could be transformed into any other methylic compound.

New and simpler methods have since been suggested by various chemists, among whom Berthelot especially must be mentioned; and enormous additions have been made to the list of so-called organic compounds which have been synthetically constructed. We give a description of the mode of producing alcohol synthetically, and shall then show that from it, as a starting-point, an immense number of other organic compounds can be synthetically produced. To obtain ethyl alcohol synthetically, several distinct steps are necessary. The first is the formation of *ethylene* (olefiant gas), C_2H_4, by addition of the elements of water H_2O. When ethylene gas is passed into strong sulphuric acid heated to 320 —358° F., the gas is absorbed, and ethyl-sulphuric acid, $C_2H_6SO_4$ is produced: this, distilled with water, yields sulphuric acid and ethyl (vinic or ordinary) alcohol:

$$C_2H_6SO_4 + H_2O = H_2SO_4 + C_2H_6O.$$

From this ethyl alcohol can in turn be obtained propyl alcohol C_3H_8O; from propyl alcohol can be obtained butyl alcohol, $C_4H_{10}O$; and from this, amyl alcohol, $C_5H_{11}O$. From the propyl alcohol thus obtained, we get by oxidation *propionic acid*, from which *lactic acid*, the acid of sour-milk, may be obtained; similarly, butyl alcohol yields butyric acid, every alcohol, in short, yielding a corresponding fatty acid by oxidation. *Glycerine*, the base of the fats, also may be obtained by a somewhat circuitous process. By combining glycerine with propionic acid, and with the other fatty acids which may be synthetically formed, we obtain several oils and fats similar to those which occur as natural products. The case of *taurin*, $C_2H_7SNO_3$, is even more striking; it is a product of various glandular metaphorphoses, but its chief source is the bile, where it exists in conjugation with cholic acid as tauro-cholic acid. This highly complex substance can readily be formed in the laboratory from sulphuric acid, alcohol, ammonia, each of which is capable of being built up from its constituent elements.

Sugar has been obtained by Berthelot from glycerine, a

substance obtainable by purely inorganic means; but as he effected the conversion of the glycerine into sugar by the action of putrefying animal tissue, the sugar thus formed can scarcely be regarded as of purely inorganic origin, though the animal tissue acted only catalytically, or as a ferment, and did not contribute any actual material to its formation. There is, however, no doubt that an unexceptional mode of producing this important alimentary substance will soon be devised, since bodies strictly allied to sugar have been already obtained. Another artificial compound of great interest in an industrial view, is *toluene* (toluol, or methyl-benzine), $C_6H_5(CH_3)$.

Important and interesting as is Synthesis in a scientific view, it has not yet been developed into an economic process for producing staple organic compounds. By no processes at present known could we produce sugar, glycerine, or alcohol from their elements at one hundred times their present cost as obtained through the agency of vitality.

See Berthelot's *Chimie Organique fondée sur la Synthèse* (1860), and his lectures on the *Leçons de Chimie professées en* 1860 *et* 1862; various lectures by Wanklyn, Frankland, and others, delivered at the Royal Institution; Odling's lectures *On Animal Chemistry* (1865); and recent works on organic chemistry, such as Miller's *Elements*, Roscoe and Schorlemmer's *Treatise on Chemistry*, and Watts's *Manual of Chemistry*.

SYNTONIN, n. *sĭn'tŏ-nĭn* [Gr. *sun*, together; *tŏnŏs*, a tension, a bracing—from *teinō*, I stretch]: muscle fibrin; principal constituent and essential basis of all the contractile tissues. S. contains, in 100 parts: carbon, 54·06; hydrogen, 7·28; nitrogen, 16·05; oxygen, 21·50; and sulphur, 1·11. It may be obtained from muscular fibrin in the form of a coherent, elastic, snow-white mass; but whether it exists in the living body in solid form or in solution is undecided. Many recent physiological writers hold the latter view, and maintain that the phenomenon of cadaveric rigidity (*rigor mortis*) is due to the S. coagulating spontaneously after death.

SYPHILIS, n. *sĭf'ĭ-lĭs* [word used by Fracastorio, Italian (1530), to signify a sort of leprosy or epidemic skin disease: perhaps from Gr. *suphar*, slough or shrivelled skin]: form of the venereal disease, very contagious. SYPH'ILIT'IC, a. *-lĭt'ĭk*, pert. to or affected with syphilis. SYPH'ILIZA'TION, n. *-ĭ-zā'shŭn*, inoculation of syphilitic matter.—*Syphilis* is in a usual nosological classification regarded as belonging to the enthetic order of zymotic diseases (see NOSOLOGY: ZYMOTIC DISEASES). These diseases have the common property of being developed in the system after the introduction of specific poisons by inoculation or implantation. The poisons which produce diseases of this order may be introduced through any abraded cutaneous surface, or through mucous membranes, especially if there be any break of continuity. A morbid poison thus introduced into the system produces a specific effect both on the tissue at the place of insertion and on the blood, as soon as the poison begins to become absorbed; in other words, it produces both a constitutional and a local change. The absorbed virus seems to undergo the following changes in the living and infected body—viz. (1) Increase, (2) Transformation, and (3) Separation or Excretion. Taking our illustrations from the disease to which this article is specially devoted, the *increase* is shown by the fact that the pus from a single syphilitic sore may by inoculation be made to spread the disease a thousand-fold. The *transformation* is indicated by the successive phenomena during the course of the disease; e.g., S. is followed, as we shall presently show, by a series of secondary and tertiary phenomena, in an approximately uniform course in different patients. The *separation* or *excretion* of the poison may be accomplished in several ways. While in some of the more intense poisons—e.g., those of certain serpents—the whole mass of the blood seems rapidly affected, in others, as S., a double process of the zymotic-like action seems to take place before the full effects which the poison is capable of producing are completed. The multiplication of the venereal poison, and its effects on the system, seem to become developed during the existence of the hardening process which surrounds the infecting venereal sore. This is the first zymotic-like process, and is attended with a local papule, and perhaps an ulcer. From this local sore the system becomes contaminated, and in the blood a second process (of zymosis ?) appears to be completed, by which the original poison becomes intensified, its pernicious influence more complete, and its specific, secondary, and tertiary effects are more fully developed (see Aitken's *Science and Practice of Medicine*, 3d ed., I. 666).

From this brief sketch of the nature of enthetic diseases, we turn to consider *syphilis*, a repulsive and disreputable disease whose ravages have been extensive among soldiers and sailors in various countries, as well as in private life. The Brit. Army Med. Reports for 1860 showed that more than one-third of all the admissions into hospital, 369 per 1,000, were on account of venereal diseases (gonor-

rhea and S.), and that the average number constantly in hospital was equal to 23·69 per 1,000 of the force (2,315 men), each remaining in hospital on an average 23½ days. In 1861 these diseases caused a loss equal to 8·69 days for every soldier serving at home, there being a daily inefficiency of 2,077 men; and the numbers are nearly the same for the succeeding years. The daily loss of service in the Brit. navy 1862 was about that of 586 men per day. Medical men expressed the fear that these data applied in large degree likewise to the civil population. S. is a contagious disease usually propagated by impure sexual intercourse. The following is a brief history of the course of the disease if not checked by remedial agents. At an uncertain period, three to ten days, after exposure to the infection, one or more venereal ulcers (commonly known as *chancres*) appear on the generative organs. These ulcers present many varieties, which have been variously classified. The following arrangement is an eminently practical one—(1) the Hunterian or indurated or infecting chancre; (2) the non-indurated or suppurative chancre (3) the ulcerative chancre; (4) The sloughing chancre. These local affections differ in their characters, and in their action on the constitution. (1) The *indurated* or *Hunterian chancre* is the only one of these local affections that can be associated with constitutional S. This variety of sore frequently gives rise to a chronic enlargement of one of the glands of the groin (forming what is termed a *bubo*), which does not involve the skin or the cellular membrane. It is followed by certain constitutional symptoms known as *secondary symptoms*, and requires, both in its primary and secondary forms, mercurial treatment. (2) The *suppurating chancre*, after continuing three or four weeks, usually heals, without leaving the hardness characteristic of the Hunterian, infecting, or indurated sore: it does not give rise to bubo, nor is it followed by secondary symptoms. (3) The *ulcerative chancre* is a ragged ulceration, secreting an ill-formed pus, and presenting an irritable surface. Soon after the appearance of this sore, one of the glands of the groin will become enlarged and painful. It is never followed by secondary symptoms, and, like the preceding form, requires only local treatment. (4) The *sloughing chancre* occurs mostly in seaports in warm countries: it does not affect the inguinal glands, and is not followed by constitutional symptoms, and requires only local treatment. —The treatment required for the last three forms, in which no constitutional symptoms occur, includes immediate and thorough cauterization with energetic caustics.—The treatment of the Hunterian or indurated chancre—the only variety of venereal sore that gives rise to secondary or constitutional symptoms—is frequently with some form of mercury; though the mercurialists and non-mercurialists have been almost equally divided. This undesirable medicine is given internally in pills or in solution; or introduced into the system through the skin, in the form of ointment; or applied to the skin in the form of vapor.

Generally, one to two months after the first appearance

of the induration (which is regarded by some writers as the first of the secondary symptoms), febrile symptoms occur, usually followed by an exanthematous eruption of the skin, often accompanied by sore throat: this eruption is a variety of *roseola*, of a rose-red color. The syphilitic eruptions which usually follow this primary rash may assume the varied forms of lichen, syphilitic tubercle, lepra, and psoriasis. Among secondary syphilitic diseases of the mucous membrane are (1) mucous tubercles, (2) deep ulcer of the tonsils, (3) syphilitic laryngitis. If the last disease is not checked, enervation, night-sweats, and dangerous exhaustion ensue; and life is often terminated by suffocation.—For the *syphilitic iritis*, also one of the secondary symptoms, see IRITIS.

Of the most important *tertiary syphilitic affections* are those which attack the bones and their coverings. They may be included under the heads of acute and chronic periostitis (the latter very common), nodes and exostosis, inflammation of bone, caries and necrosis. Next to these are tertiary affections of the skin and mucous membrane, which consist mainly of intractable ulcerations attacking the face (especially the nose and lips), nails, ears, and mucous membranes of the various openings of the body; and diseases of the glands. In many of these cases, a modified form of mercurial fumigation is useful; or iodide of potassium, combined with any of the preparations of sarsaparilla, may be employed.

THE SYPHILIS OF CHILDREN.—If the constitution of either the father or mother of an infant is saturated with the syphilitic poison, the child may be born with certain symptoms indicating that it is suffering from *congenital syphilis*. Moreover, the child of a mother having a primary sore, but no constitutional symptoms, may be inoculated with S. during the act of delivery; or the disease may be communicated in vaccination (if the matter be derived from an impure source); or by contact with syphilitic sores on the persons of wet-nurses or others. All these cases are included in the *infantile* variety of the disease. Congenital S. frequently causes the death of the fetus at about the fourth or fifth month. In the majority of cases, the disease does not show itself till about six weeks after birth. Whatever may be the case among the poor, there is no doubt that, in the better classes, congenital S is usually from the father, the mother being unaffected except through the fetus. There is scarcely a doubt that a woman carrying a syphilitic fetus may become thus infected with secondary S. by the exchange of fetal and maternal blood in the placenta; and this explains how it is that women who have never had the primary infecting sore occasionally show all the symptoms of secondary S. after living for some years with husbands similarly affected.—As to the communication of *infantile* (not *congenital*) S. by vaccination, there is undoubted evidence that in 1861, in a thinly populated district of Piedmont, where S. is virtually unknown, 46 children of various ages were simultaneously attacked with S. proceeding from

chancres in the arm, and followed by buboes (enlarged glands) in the armpits; and that all these children had been vaccinated directly or indirectly from a single child, who was subsequently proved to have contracted S. from a wet-nurse; and, further, that these children transmitted the same disease to a number of women, their wet-nurses, mothers, etc., and even to children who nursed and played with them; that the women so infected communicated the disease to their husbands; and, finally, that the disease yielded in all cases to the ordinary treatment adopted in S. Cases in which the nipple of the wet-nurse has been infected by a syphilitic infant are not rare.

A prominent British medical practitioner and writer indicates the following means of prevention of S. 1. *Continence*, promoted by (*a*) Cultivation of a religious feeling and of pure thought and conversation; (*b*) Removal from temptation and occasions to sin; (*c*) Constant and agreeable employment, bodily and mentally; (*d*) Temperance. 2. *Early marriage.* At the time of this practitioner's writing, only six per cent. of Brit. soldiers were allowed to marry. 3. *Precautions after the risk of contagion.* In some French towns, the use of lotions and washing is rigorously enforced, with the effect of lessening disease considerably. 4. *Cure of the disease in those affected by it.* Health-inspections, in special reference to venereal diseases, are made weekly in some armies by the surgeon or assistant surgeon; and similar inspections of all recognized prostitutes have long been made by legal authority in many parts of Europe. The results of such legal action in Britain have not been satisfactory; and in the United States, such action is revolting to public sentiment, and has scarcely been attempted. For an account of the various plans adopted in Europe for prevention of S.—such as registration of brothels and of prostitutes, and enforcement of periodic examinations at short intervals—see works of Parent-Duchatelet, Acton, Sanger, and others on Prostitution; Lancereaux's *Treatise on S*; Lee's *Lectures;* and numerous articles in the medical and other reviews.

Toward the close of the 15th c., a great epidemic of S. pervaded Europe, and was then supposed to have been imported from the new world: in the 16th c. S. was recognized as the result of a specific virus. The history of this disease from the middle of the 18th c. is divisible into three distinct periods, in each of which very different views have been prevalent: 1. *The period and doctrine of Hunter*, who believed that the various forms of S. and gonorrhea depend on one and the same poison—a view taught by Carmichael in Dublin, Cazenave in Paris, and others. 2. *The period and doctrine of Ricord*, who proved that gonorrhea was quite distinct from S., and that inoculation with gonorrheal matter will not cause a chancre; and that there are *two* classes of chancres, the *soft* and *hard*, originating from the same source. 3. *The present period*, beginning 1856, in which it is held that, exclusive of gonorrhea, there are *two* forms of the syphilitic poison. It has been judiciously advised that in accordance with the present knowledge of

this disease, the terms *syphilis* or *syphilitic* should be restricted to such cases as are believed to be of a specific infecting kind; while the term *local venereal sore*, or *venereal ulceration*, should be applied to those cases which require merely local treament, and are not followed by constitutional symptoms.

The symptoms of S. are far less grave now than they were formerly. One reason assigned for this is that mercurial treatment was formerly continued till the full physiological effect was observed, thus aggravating the primary complaint. But Prof. John Chiene of Edinburgh Univ., while conceding that there may be some truth in that explanation, finds the principal reason to be that 'the syphilitic organism does not now find so suitable a nidus or soil for its growth and development as it once did.' He holds that, at least in Great Britain, S. is now 'in the stage of an epidemic in its decline.' Prof. Chiene thus postulates a sort of exhaustion by age of the disease organisms: and one might with at least equal reason postulate a general 'syphilization' (or protective inoculation with syphilitic virus) of the population (see SYPHILIZATION) by diffusion through generation. With what general impairment of vigor in the constitution of the race, or of any portion of it specially involved, such a process may be attended, is not known.

SYPHILIZATION, in Medicine: operation which has the double object of eradicating syphilis already existing in the system, and of securing permanent immunity from any future attacks, by repeated inoculations of syphilitic poison. In 1844, a French physician, Auzias Turenne, undertook experiments for testing whether syphilis could be communicated to the lower animals. His experiments proved that it could be so communicated by inoculation. He likewise found that the chancres produced by inoculation became less and less in each animal, until a period at length arrived at which the poison seemed to have lost its power, and no further sores could be produced; thence he was led to believe that by prolonged inoculation the system became protected. In 1851, Prof. Boeck of Christiania, travelling in Italy, had his attention drawn to the doctrine of S.; and afterward became the great authority on the subject; claiming from the practical results of S. that it gave both remedy, and immunity from infection. But the progress of S. in practice has been small. Most surgeons concede the general correctness of Prof. Boeck's views; but the practice itself is offensive, and the time necessary for it forms a strong objection to its practice: in Sperino's (of Turin) experiments, the treatment extended from 9 to 20 months or more. The practice has been in vogue in Christiania under Boeck and his colleague; but it is unlikely to command attention other than of scientific kind.

SYPHON: see SIPHON.

SYRA, *sī'rā* (Gr. *Syros*): the most important, though not the largest, of that group of islands in the Ægean Sea known as the Cyclades (see ARCHIPELAGO: GREECE); 13 m. s. of Andros; about 10 m. long by 5 broad; 42½ sq. m. It is bare, hilly, and not very fertile. The products are wine, tobacco, grain, citrons, figs, honey, and vegetables; but the greater portion of the necessaries of life have to be imported. Its prosperity is quite modern. During the war of independence, S. remained neutral, and, in consequence, numerous fugitives flocked thither, under protection of the French flag, from other parts of Greece, especially from Chios and Psara, who, besides adding largely to the population, brought a spirit of political activity and commercial enterprise, whose beneficial effects are strikingly visible. The capital, *Syra* or *Hermopolis*, on a bay on the e. side of the island, rises terrace-wise from the shore, is well built, and is the seat of govt. for the Cyclades, and the residence of foreign consuls: pop. (1879) 4,398. It has numerous educational institutions, 4 printing-presses, 3 weekly newspapers. S. has become the great commercial entrepôt of the Ægean. Nearly one-half of all the imports of Greece reach it through this port. It builds more ships than any other town in the Levant, and owns one-third of all the Greek merchantmen. It has regular steam-communication with the principal trading-towns in the Levant.—Pop. of island, about 34,000.

Ancient notices of S. are scanty. Homer praises it in the *Odyssey* as 'rich in pastures, in herds, in wine, in wheat;' but it has no history.

SYRACUSE, *sĭr'a-kūs:* city, cap. of Onondaga co., N. Y., on Onondaga Lake, and on the Delaware Lackawanna and Western, the New York Central and Hudson River, the Rome Watertown and Ogdensburg, and the West Shore railroads, and at intersection of the Erie and Oswego canals; nearly midway between Albany and Buffalo; 20 sq. m.; known as 'the Central City,' from its geographical location in the state, and as 'the Saline City.' It has a healthful, delightful climate, is well drained and sewered, and its extreme summer temperature has averaged 95° for many years, and extreme winter temperature −22°. The city has a new water-system, with its source of supply at Skaneateles Lake; there are over 190 m. of mains, and the cost of the equipment was $4,000,000. There are (1902) over 300 m. of streets and 60 m. of street railways. There are 24 public parks and 6 public squares. Notable among the parks are Prospect, Comstock, Demong, Highland, Fayette, Foreman, and Billings.

The salt industry, for which S. was long famous, has steadily declined: the investment, which at one time reached $14,000,000, is now less than $1,500,000. In 1890 experiments made outside the state salt reservation and within a few m. of S. disclosed at a depth of 1,200 ft. a bed of rock-salt, which was readily converted into saturated brine. It was found that this brine could be converted into salt for the market at 33 per cent. less cost than brine pumped from the state wells. The industries that yielded the largest products were, in order: clothing $3,000,000; chemicals $1,400,000; ales $1,400,000; pork and beef packing $1,250,000; carriages and wagons $1,100,000; salt $1,000,000; boots and shoes $1,000,000; flour and feed $1,000,000; cigars $650,000; steam-heating apparatus $600,000; frames and moldings $600,000. In 1900 the capital invested by 1,383 establishments was $31,358,055; number of wage-earners, 14,917; value of materials, $14,771,128; of products, $31,948,055.

The public schools (1896) numbered 31, with an enrolment of over 21,000. The S. Univ. (Meth. Episc.) leads the educational institutions. It had (1897) 1,174 students, 121 professors and instructors, and 46,543 vols. in library; pres. Rev. J. R. Day, S.T.D., LL.D. The institution comprised a college of liberal arts, a medical college founded 1873, and a college of fine arts founded 1875. Among numerous recent gifts the most notable are the observatory, built and equipped by E. F. Holden as a memorial of Charles Demorest Holden; the John Crouse Memorial College; and the noted historical library of Leopold von Ranke (q.v.), purchased and presented by Dr. and Mrs. J. M. Reid at a cost of $50,000. This remarkable collection, for which there were many American and European bidders, comprises nearly 50,000 vols. and about 70,000 MSS. and pamphlets, and is now housed in a new library building erected expressly for it.

The churches (1896) numbered 84—9 Presb., 8 Bapt., 20 Meth. Episc., 7 Prot. Episc., 11 Rom. Cath., 7 Luth., 5 Congl., 4 Evangl., 7 Jewish; Unitarian, Universalist, Reformed, Disciples, Independents, and Christian Science,

each 1. S. is the seat of a Prot. Episc. and of a Rom. Cath. bp. There is an attractive Y. M. C. A. building, which cost $60,000, and contains a gymnasium, reading-room, and concert-hall. Other prominent buildings are the U. S. custom-house and post-office (estimated cost $500,000); co. court-house; co. penitentiary; state armory; State Asylum for Idiots (opened 1851); co. orphan asylum; St. Vincent de Paul Orphan Asylum; House of Providence; German Lutheran Taber Orphan Asylum; Old Ladies' Home; Shelter; House of the Good Shepherd; St. Joseph's Hospital; and the Women's and Maternity Hospital.

In 1893 S. had net public debt of $4,058,155; real property valuation $77,384,690; personal $5,439,290; tax-rate $2.083 on $100. There were 6 national banks (cap. $1,330,000), 4 state banks (cap. $425,000), 2 sav. banks (surplus $2,110,000), and 1 trust and dep. co. (cap. $100,000); and 4 daily, 2 semi-weekly, 5 weekly, 8 monthly, 1 quarterly, and 2 occasional periodicals. In 1896 the valuation of real estate was $45,000,000; personal property $4,000,000. A portion of the site of S. was settled prior to 1794, when the first salt-spring was developed. This section was incorporated as the village of Salina 1809. The other portion was laid out for a village and named South Salina 1804, and was incorporated 1825. In 1847 the two villages were united as the city of Syracuse, and 1887 the adjoining villages of Geddes and Danforth were consolidated with it. Pop. (1880) 51,792; (1890) 88,143; (1900) 108,734.

SYR'ACUSE: anciently the most famous and powerful city of Sicily (q.v.); on the s.e. coast of the island, 80 m. s.s.w. of Messina; one of the earliest Greek settlements in the island, founded by Corinthian settlers under Archias, one of the Bacchiadæ, B.C. 734. The original colonists seem at first to have occupied nothing more than the little isle of Ortygia, about one mile long and half a mile broad, near the shore. It rapidly rose to prosperity, and was enabled to establish sub-colonies of its own: Acræ B.C. 664, Casmenæ B.C. 644, and Camarina B.C. 599. Nothing definite is known of the early political state of S.; but before B.C. 486 the political power had passed into the hands of a few leading families, or perhaps *clans*, who constituted an oligarchy, while the great body of the citizens formed a malcontent democracy. In that year a revolution took place. The oligarchic families—*Geomori* or *Gamori*, 'landowners;' probably descendants of the original colonists, like the patrician *gentes* of Rome—were expelled, and the sovereign power was transferred to the citizens at large. Before a year passed, however, Gelon (q.v.), 'despot' of Gela, had restored the exiles and made himself master of S. He was a great ruler, and under him the city increased in size and wealth. It is believed to have been in Gelon's time that the adjoining mainland was first built upon. The locality of the new settlers was the slopes and heights of Achradina, or the 'outer city,' a triangular table-land n. of the island of Ortygia, and subsequently connected with it by a mole. This ultimately became the most extensive and populous quarter of S.—contained the Agora, a temple of Zeus Olympios, the Prytaneum, with a

splendid statue of Sappho, the fine monuments to Timoleon and the elder Dionysius (q.v.), etc. Of the other two quarters of the city, the date of settlement is not known. These were Tyche—so called, according to Cicero, from an ancient temple of 'Fortune' there—occupying a plateau w. of Achradina; and Neapolis (New City), stretching along the s. slopes of the plateau, and overlooking the marshes of the Anapus and the 'Great Harbor,' a spacious and well-sheltered bay, about five m. in circumference. Neapolis became one of the finest parts of Syracuse. Here were the theatre, amphitheatre, and numerous temples, of which hardly a relic remains, except of the theatre. Ortygia contained the castle or citadel.

Reverting to an outline of the history of S.—a noticeable characteristic of the reign of Hiero (q.v.), successor of Gelon, is his cultivation of the fine arts, and his patronage of men of genius, as Æschylus, Pindar, etc. B.C. 466 the democracy again got the upper hand—Thrasybulus, a 'tyrant' of the baser sort, being expelled; and for 60 years under a free and popular government S. flourished more than ever before. During this period occurred its great struggle with Athens B.C. 415–414, in which it was victorious; and its renown at once spread over the whole Greek world. But a new power appeared on the stage—the Carthaginian, whose conquests in Sicily, toward the close of the 5th c., threatened the supremacy of S. Meanwhile, Dionysius (q.v.) restored the 'tyranny' as under Gelon, and during a reign of 38 years greatly increased the strength and importance of the city. He constructed the docks in the Greater and Lesser Harbors, and surrounded the city with fortifications. His fierce and victorious war with Carthage B.C. 397, raised the renown of S. still higher. The reigns of the younger Dionysius (q.v.) and of Dion were unsettled; but after restoration of public liberty by Timoleon B.C. 344, a brief season of tranquillity ensued, during which prosperity rapidly revived. Under Agathocles, however, the despotic form of government was again established B.C. 317, and continued with scarcely an interruption, till the conquest of the city by the Romans, B.C. 212, during the Hannibalic war—the ruler of S., Hieronymus, a rash and vain young man, having abandoned the prudent policy of his grandfather, Hiero (q.v.), broken the alliance with Rome, and joined the Carthaginians.

Under the Romans, S. slowly but steadily declined, though it remained the capital and the first city of Sicily. Captured, pillaged, and burned by the Saracens A.D. 878, it sunk into complete decay, and is at present confined to its original limits, Ortygia, which, however, is no longer an island, but a peninsula. The streets of the modern town are, with few exceptions, narrow and dirty. S. has a cathedral, a museum of classical antiquities discovered in S. and the neighborhood, a public library, with some curious MSS., numerous churches, monasteries, and nunneries; and has a trade chiefly with Malta in wine, oil, salt, and salt-fish. It has several remains of ancient and mediæval edifices, much visited by travellers.—Pop. (1892) 28,000.

SYR-DARIA, *sēr-där'ĭ-â* (YELLOW RIVER), or SIHÛN, *sĭ-hōn'*—formerly JAXARTES, *jăks-ăr'tēz:* river of Turkestan, rising in the high plateau s. of Lake Issikul, in the Thian Shan Mts. It flows w. through the valley of Khokan, receiving numerous accessions; after passing Otrar, it divides into two branches; the largest and most northerly retaining the name Syr Daria, flows w.-by-n., separating the Russian territory from the steppes of Turkestan, and, after a course of 1,150 m., falls into the Sea of Aral; the smaller branch, Kuvan-Daria, flows w., supplying some small lakes in the line of its old channel, but for several years has not reached the Sea of Aral, though 60 years ago it had greater volume of water than the Syr-Daria.

SYREN: see SIREN.

SYRIA, *sĭr'ĭ-a* (Ar. *E'sham*, Turk. *Soristan*): division of Asiatic Turkey, bounded n. by portions of Asia Minor, w. by the Levant, s. by Arabia Petræa; on the e. and s.e. its boundary is rendered indefinite by the sands of the desert, but at length becomes fixed by the course of the Euphrates. It extends about 380 m. along the Mediterranean coast, and on the e. it insensibly merges into Arabia: about 115,144 sq. m. Population more than 3,000,000. S. is divided into several governments, which frequently change their limits: they are usually named after the principal towns—Aleppo, Damascus, and Beyrout. The whole region is traversed by a double mountain-chain—of which Lebanon (q.v.) forms the highest part—touching in its n. extremities the Alma Dagh (anc. *Mons Amanus*), and in its s. forming the Sinaitic range. The central part of this mountain system, which in many places exhibits the characteristics of a plateau, presents on the w. a steep front toward the Mediterranean, but on the e. rolls gradually away into the level uplands of the Syrian wilderness. The most noticeable features of the long *furrow* between the double ridge, beginning at its s. end, the Gulf of Akaba, are, the waterless wady of Arabah, the narrow, deep-sunken region known as *El Ghur*, through which the river Jordan flows and which embraces the Dead Sea and the Sea of Galilee, and the vale of Cœle-Syria (q.v.), and its great continuation northward, watered by the Nahr-el-Asy (anc. *Orontes*). The w. ridge is broken through in three places; in the n. by the lower Orontes; in the middle near Tripolis—where the chain of Lebanon properly terminates—and further s. near Tyre, by the Leontes. South of Tyre, it recommences in the hill-country of w. Palestine (q.v.), which finally passes into the desert plateau of El Tyh, in the Sinaitic peninsula. The e. ridge is less sharply defined; its most conspicuous elevations being Anti-Libanus (see LEBANON, MOUNT), the mountains of Moab (e. of the Dead Sea), and Mt. Seir, overlooking the wady Arabah. The principal rivers are the Orontes (q.v.), the Leontes, the Jordan (q.v.), the Barada or Abana, the river of Damascus. The only notable lakes are the Dead Sea (q.v.) and the Sea of Galilee (see GENNESARET).

Although S. belongs to the countries comprised within the Asiatic rain-zone, yet in general the climate is exces-

sively dry and hot, differing little from that of Arabia. Drought and scantiness of vegetation characterize almost equally the uplands and the valleys. Only where the mountains are lofty, the streams abundant, and the atmosphere somewhat maritime, as in the terraced slopes of Lebanon, do we find some approach to tropical luxuriance in flower, and fruit, and tree. Forests of evergreens, beautiful grassy pastures, and meadow-tracts are found there; and wheat, maize, rice, etc., are largely produced. The cultivation of the vine, the cotton-tree, the mulberry, and the finer sorts of fruits, as the olive and fig, is considerable; and indigo and sugar-cane are raised in the valleys of the Jordan and the region about the Dead Sea. The fauna of S., like its climate and vegetation, is similar to that of Arabia. The camel is of almost as much importance as further south; and the Syrian deserts, particularly toward the n., are the home of gazelles, hyenas, jackals, bears, buffaloes, and other wild animals.

The greater part of the Syrian mountains is limestone; mountain limestone in Lebanon, chalk in Anti-Libanus, and Jura limestone in Palestine. In the last of these, volcanic formations occur, especially in the region of the Jordan and the Dead Sea, where hot springs, beds of bitumen and sulphur, the shapes of the hills, and the frequent earthquakes, give evidence of volcanic activity. Salt is the only important mineral, and is exported in considerable quantities; coal, however, is worked near Beirût. Sheep, goats, with hanging ears and silky hair, cattle mules, and asses, form, as in ancient times, a great part of the wealth of the inhabitants.

Silk is the chief article of manufacture—at Aleppo, Beirût, Damascus, etc.; but cotton and woolen fabrics, gold and silver thread-stuffs, glass, earthenware, leather, soap, etc., also are manufactured. Lack of roads is a great hindrance to industrial activity. The first carriage road was opened 1863, between Beirût and Damascus. The other roads, except one or two short carriage-ways in Mt. Lebanon, are mere mule and camel tracks.

The *religious* sects are numerous. Most of the people are Mohammedans; but Christians of the Greak Church number 180,000; Maronites (q.v.) and Roman Catholics, 310,000; Jews, 40,000; Druses (q.v.), 90,000; lesser sects, about 30,000. The inhabitants are in some sense a mixed people, for the country has experienced many political vicissitudes; but by far the greatest number, whether Christians or Mohammedans, are of Shemitic origin, either Phœnician, Aramæan, or Arabic. Their Turkish rulers, however, and such Turkomans and Kurds as are settled in the north of S., belong to the Turanian race. Arabic is everywhere spoken, and may be considered the national language, since the old Syriac (q.v.) or Aramaic tongue is wholly dead, except among the Nestorians of Kurdistan.

The *history* of S. stretches back into remote antiquity. In the time of Abraham (conjecturally, in lack of historical chronology, about B.C. 2000) Damascus was a city; in the oldest literature of Greece, Sidon figures as the capital

of a rich, populous, and civilized state; and in the Hebrew Scriptures, Canaan or Palestine had numerous towns at the period of its conquest by Joshua; but, like most other so-called nations in early times, S. did not form a single state; it was rather a congeries of independent states whose inhabitants belonged to the same race. Every important city had its king, whose normal occupation was fighting with his neighbors.—*Canaan*, the land later called Palestine, was, at the time of the Israelitish conquest, inhabited by a population of kin to the Phœnicians, the *Canaanites*, a name that appears to have been applied originally to the inhabitants of the coast only. The language of the Canaanites was like the Hebrew. The political geography of Canaan is involved in confusion, hence it is extremely difficult to fix the distribution of the tribes. The Amorites, occupying the s. portion of Canaan as also the n. part of the country beyond Jordan, were the most powerful of the Canaanite peoples. Of the other tribes, the Girgashites, Hivites, and Perizzites inhabited the centre of the country; the Jebusites dwelt near Jerusalem; in the s.w. were the Philistines (q.v.). The Hittites (q.v.) dwelt beyond the borders of Canaan. The Moabites, Ammonites, and Edomites inhabited a district in the s. of the country beyond Jordan, thus not within Canaan: these three tribes were nomadic.—Modern research has developed proofs of kinship between the Canaanites and their supplanters, the people of Israel. Thus, many Canaanitish personal names, as Adonizedek, Melchizedek, Ornan, need no interpretation to one acquainted with Hebrew; and the names of Canaanitish towns as given in the Bible and in certain Egyptian inscriptions of the time of Thothmes III. are pure Hebrew.—The religion of the Canaanites centred in the worship of the god Baal and Asherah—the god of life and fruitfulness and his consort.—That the Canaanitish population was not exterminated by the Israelite conquerors, but was suffered to retain possession of many parts of the country, may be gathered from sundry passages of the Hebrew Scripture, e.g. Josh. xiii. 13, xv. 10, 63, xvii. 12; Judges i. 19–36; and biblical narratives of later date. In the Fellahîn of Palestine to-day many authors recognize descendants of the pagan inhabitants of Canaan. The peculiar superstitions of these Fellahîn or peasants betray no reminiscence of Hebrew religion, and are evidently survivals of some early form of worship. In this view Thomson (see *The Land and the Book*) coincides with regard to the religion or superstition of one of the modern sects of n. Syria, the Nuzarieh. Under David and Solomon something like political unity was achieved for a large portion of S.; yet it does not appear that these great rulers dispossessed of their territories the princes whom they subdued, but only made them tributary; and after their death affairs reverted to their previous condition. Rezin, a slave, then made himself master of Damascus, and extended the Damascene monarchy over all n. and central S.; but the conquests of Tiglath-Pileser resulted in its becoming a province of the Assyrian empire. Subsequently, the

whole land, including Palestine, became part of the successive empires of Babylonia, Media, Persia, and Macedonia. Then followed the dynasty of the Seleucidæ (q.v.). After their fall, S. passed into the hands of the Romans, who retained it, though not continuously—for on several occasions the Persian Sassanidæ (q.v.) wrested it from them—until the Arab conquest in the 7th c. after Christ. During the Crusades (q.v.) of the middle ages, several Christian principalities were established here, but endured for only a short period. S. then became a possession of the sultans of Egypt, in whose time it was frightfully devastated by the Mongols. In the 16th c., it was conquered by the Turks, and has ever since formed part of the Turkish empire.—See PALESTINE.

SYRIAC, a. *sĭr'ĭ-ăk:* of or relating to *Syria* or its language: N. the language of Syria. SYR'IACISM, n. *-ă-sizm*, a Syriac idiom or peculiarity. SYR'IAN, n. *-ăn*, a native of Syria: ADJ. pertaining to Syria.—*Syriac* is the language of Syria; specifically, a dialect of Aramaic which about the beginning of the Christian era was developed into a literary language in w. Mesopotamia. Its form and laws were first fixed definitively when, in the 2d c., the Bible was translated into it. This S. version (called Peshito [q.v.] or Peshitta) became the Bible of Aramean Christendom. The influence of Greek on the later development of S. is very apparent. A voluminous literature, mostly ecclesiastical, was produced in S. between the 3d and 7th c. In the eastern Roman empire, S. was after Greek the most important language of the oriental provinces. S. began to decay after the rise of Mohammedanism, and as a means of communication between peoples speaking diverse tongues it gave place to Arabic. It is still used for literary and ecclesiastical purposes, but has long been a dead language. See SEMITIC LANGUAGES.

SYR'IAC VER'SIONS: versions of the Old. Test., current among the Syrian Christians. Besides the Peshito (q.v.). there were other Syriac versions. These did not acquire canonicity, and were chiefly translated from the LXX; the best known is one drawn up from the text of the Hexapla (q.v.; compare also ORIGEN), which it follows slavishly, without regard for Syriac idiom or grammar. It contains the critical marks of Origen, and is moreover furnished with numerous variants, fragments from other Greek versions, and exegetical scholia. Bp. Paulus of Tela is supposed to have composed it at the instigation of Bp. Athanasius, 617. There are now only a few (imperfect) MSS. extant of it—one in Paris, one in the Ambrosian Library, a third has disappeared, and further portions are found in the Nitrian collection in the Brit. Museum. The greater part of the biblical books has been edited from it, but in separate publications. A complete edition is still a desideratum. A more complete edition of the Hexapla itself has been attempted by a reconstruction of lost portions of the Greek, through the medium of the parallel Syriac passages preserved in this translation.—Two other MSS. in the Paris Library contain fragments of another

Græco-Syriac version, by Jacob, Bp. of Edessa, who, 703,4 composed it from the Peshito and the above translation—i.e., made a new recension of Paulus of Tela's work, corrected after the Peshito.

SYR'IAN JAC'OBITES: see JACOBITE CHURCH.

SYR'IAN RITE, CHURCH OF: that portion of the oriental church which had its seat in Syria, and which was anciently comprehended in the patriarchate of Antioch, and (after that of Jerusalem obtained a distinct jurisdiction) in the patriarchate of Jerusalem. The Syrian Church of the early centuries was exceedingly flourishing. Before the end of the 4th c., it numbered 119 distinct sees, with a Christian pop. of several millions. The first blow to its prosperity was the fatal division which arose from the controversies on the incarnation: see MONOPHYSITES, NESTORIANS: EUTYCHES. The Eutychian heresy, in one or other of its forms, obtained wide extension in Syria; and the usual results of division ensued in the corruption and decay of spiritual religion. The Moslem conquest accelerated the ruin thus begun; and from the 7th c. onward, this flourishing church declined into a weak and spiritless community, whose chief seat was in the mountains, and whose best security from oppression lay in the belief on the part of the conquerors of their utterly fallen and contemptible condition. For the most remarkable incident in the later history of the Syrian Church, see MARONITES. This branch of the eastern Christianity, though for the most part divided from the orthodox Greek Church by the profession of monophytism, took part with the Greeks in their separation from the west, under Michael Cerularius; and the reunion of the Maronites to Rome had the remarkable result of establishing side by side, within the narrow limits occupied by the Christians under Moslem rule in Syria, two distinct communities, speaking the same language, using the same liturgy, and following the same rites; and yet subject to two different patriarchs, and mutually regarding each other as heretics and apostates from the ancient creed of their country.

The chief peculiarity of the Syrian rite, as distinguished from the Greek, consists in its liturgy, and the language of that liturgy, which is Syriac, and with which the people, and in many cases the priests, are entirely unacquainted. The liturgy is known as the Liturgy of St. James. The Syrians agree with the Greeks in the use of leavened bread, in administering communion in both kinds, in permitting the marriage of priests (provided they marry before ordination), and in administering the unction of confirmation at the same time with baptism, even to infants.

The Christian community of Syria may at present be divided into four classes: the Maronites (q.v.), the Greeks (called also Melchites—q.v.), the Monophysites, called Jacobites (see JACOBITE CHURCH), and the primitive Syrian Christians (not Maronites), in communion with Rome. This last-named community forms the small remnant of the ancient Syrian Church, which remained orthodox dur-

ing the controversy on the Incarnation, at the time of the general lapse into Monophysitism. To these are to be added the Christians of the Latin rite and a few Protestants. The Maronites number about 160,000; the Greeks are said to be about 180,000; the Jacobites of Syria and of Armenia Proper are said to reckon together about 40,000 families, of which, however, probably scarcely 10,000 can be assigned to the Syrian Church. The non-Maronite Syrians who follow their national rite, but are in communion with Rome, are supposed to amount to about 5,000. The resident Latins are chiefly members of the religious orders who from immemorial time have possessed convents in the Holy Land, and European Rom. Catholics who have settled permanently, or for a time, at Jerusalem, Beirût, and Damascus. None of these belong in any sense to the Syrian Church. The belief, and in most particulars the disciplinary practice, of these several classes coincide substantially with those respectively of the same communities in the other churches of the East. All (except the Maronites and the few United Syrians) reject the supremacy of the Roman see. The Syrians of the Greek communion reject the double procession of the Holy Ghost (see FILIOQUE), and the Jacobites firmly maintain their old tenet of Eutychianism. Among them all are found monks and 'religious' women. All enforce celibacy on their bishops, and refuse to priests the liberty of a second marriage, or of marrying after ordination. The practice of fasting prevails among all alike. They practice invocation of saints, prayers for the dead, and the use of painted, though not of graven, images. Many particulars regarding them are in the memoirs of recent missionaries of the several denominations—particularly letters published by the French Soc. for Propagation of the Faith.—For the modern Nestorians, and the Syrian Christians of Travancore, see NESTORIANS.

SYRINGA, n. *sĭ-rĭng'gă* [Gr. *suringx*, a pipe]: genus of plants of which the lilac is the type, belonging to the Olive family (*Oleaceæ*); but the name S. is popularly applied in the United States to the Mock-orange (*Philadelphus coronarius*, q.v.), of another family, *Saxifragaceæ*, with cream-colored, very odorous flowers; also to the scentless *Philadelphus inodorus*, var. *grandiflorus;* both natives of mountains of Va. and south, and both cultivated. SYRINGINE, n. *sĭr-ĭn'jĭn*, bitter principle obtained from the leaves of the lilac. SYR'INGOT'OMY, n. *-got'ŏ-mĭ* [Gr. *tŏmē*, a cutting]: in *anat.*, operation of cutting for fistula.

SYRINGE, n. *sĭr'ĭnj* [Gr. *suringx*, a pipe or tube]: hydraulic instrument, familiarly called a squirt, consisting of a cylinder of metal or glass, having at one end a conical nozzle, and the other end fitted with an air-tight piston. The nozzle being inserted in a liquid, the retraction of the piston draws the liquid into the cylinder, on the principle of the Pump (q.v.), and by its forward pressure the liquid is expelled in a jet from the nozzle. Syringes for use in injections are now commonly constructed in the form of two india-rubber tubes, with a hollow bulb or ball of india-

rubber communicating by valved openings with the exit tube and with the inlet tube or pipe immersed in the fluid—the valves opening in contrary directions, so that when the bulb is compressed the valve in the neck of the exit tube opens and that at the inlet pipe shuts, and *vice versa*. Syringes are constructed also on the principle of the siphon, and actuated by gravity: thus, in reservoir syringes, the supply of fluid is placed at some height above the point where the liquid is to issue, the two points being connected with a flexible tube. SYRINGE, v. to inject, wash, or clean with a syringe. SYR'INGING, imp. SYR'INGED, pp. *-ĭnjd.*

SYRRHAPTES, *sĭr-răp'tēz:* genus of birds of the Grouse family (*Tetraonidæ*), of which only one species is known (*S. Pallasii*), native of the deserts of Tartary, abundant in the neighborhood of Lake Baikal. From its peculiar characters, which led Pallas to call it *Tetrao paradoxus*, it has received the pedantic name of *Heteroclite Grouse*. The legs and toes are short, and densely feathered; the toes are joined together for most of their length. The bird walks with difficulty, but flies well, though usually only a short distance. The wings and tail are very long, terminating in remarkably long, slender, pointed plumes.

SYRTIS MAJOR, *sĭr'tĭs mā'jĕr*, AND SYRTIS MINOR, *mī'nĕr* [Syrtis from Ar. *sert*, desert]: ancient name of two gulfs of the Mediterranean Sea, on the n. coast of Africa. Syrtis Major (now *Gulf of Sidra*) is between Cape Mesurata, in Tripoli, and the table-lands of Barca, and forms the most s. part of the Mediterranean. Syrtis Minor (now *Gulf of Cabes*) is between Tunis and Tripoli. The shores of both are inhospitable, and abound in quicksands, which, carried by the wind, are said by the ancients to have frequently overwhelmed vessels, and the reports of modern travellers seem to some extent to confirm these traditions. Their waters are (or were) dangerous to sailors, on account of numerous shallows, sandbanks, and sunken rocks.

SYRUP, n. *sĭr'ŭp* [F. *sirop;* It. *siroppo;* Sp. *xarope*, sweet juice—from Ar. *sharib*, wine or any beverage]: mixture of sugar or honey and water, flavored; especially, a medicated solution of sugar in water: juice of the sugar-cane; the liquid refuse of sugar, finer than molasses. *Syrup, sherbet*, and *shrub* all are derived from Ar. *srb;* Syrup through the Latin, Sherbet through the Persian, and Shrub through the Hindu. S., in its simplest meaning, is a saturated solution of sugar boiled to prevent fermentation; but it means also the juice of fruits saturated with sugar, and various flavored liquids treated in the same way. Generally the finest refined sugar is used; and effort is made to get the syrup clear and free from all feculent matter. Syrups of fruits are much used on the European continent to mingle with water for drink, and are very wholesome. SYR'UPED, a. *-ŭpt*, moistened with sugar or honey. SYR'UPY, a. *-ŭp-ĭ*, resembling syrup; sweet.

SYSTEM, n. *sĭs'tĕm* [Gr. *sustēma*, an assemblage of many things put together—from *sun*, together; *histēmi*, I place or set: F. *système*]: a combination of things acting together; an assemblage of things arranged in regular order; a plan or scheme in which many things or parts are reduced to regular order and dependence; regular method or order. SYSTEMATIC, a. *sĭs'tĕm-ăt'ĭk*, or SYS'TEMAT'ICAL, a. *-ĭ-kăl*, formed or done according to system; proceeding according to a regular plan or method; methodical. SYS'TEMAT'ICALLY, ad. *-lĭ*. SYSTEMATIZE, v. *sĭs'tĕm-ă-tīz*, to reduce to a system or method. SYS'TEMATIZING, imp. SYS'TEMATIZED, pp. *-tīzd*. SYS'TEMATIZA'TION, n. *-tĭ-zā'-shŭn*, the act of reducing to a system. SYS'TEMATI'ZER, n. *-zĕr*, or SYS'TEMATIST, n. *-tĭst*, one who reduces to a system. SYSTEMIC, a. *sĭs-tĕm'ĭk*, in *med.*, belonging to the body as a whole; common to a general system. SYSTEMIZE, v. *sĭs'tĕm-īz*, same as SYSTEMATIZE. SYS'TEMLESS, a. *-lĕs*, without system.

SYSTOLE, n. *sĭs'tō-lē* [Gr. *sustŏlē*, a drawing together—from *sun*, together; *stellō*, I send]: in *gram.*, the shortening of a long syllable; in *med.*, the contraction of the heart and arteries for expelling the blood and carrying on the circulation (see CIRCULATION—*Physiology*). SYSTOLIC, a. *sĭs-tŏl'ĭk*, pertaining to systole; contracting.

SYSTYLE, a. *sĭs'tīl* [Gr. *sun*, together; *stulos*, a column]: in *classic arch.*, having the arrangement of columns in such a manner that they are two diameters of a column apart; having a row of columns set close together, as in the Parthenon at Athens.

SYTHE and SITHE, n. *sīth:* other spellings of SCYTHE, which see.

SYZRAN, *sĭz-rân':* town of central Russia, govt. of Simbirsk, on the right bank of the Volga, about 150 m. below the town of Simbirsk. It owes its foundation to its advantageous commercial position on the Volga, and in the middle of a district teeming with agricultural produce. From the wharves of S., 150 vessels, laden with corn, are annually dispatched to Rybinsk and St. Petersburg. Pop. (1882) 24,500.

SYZYGY, n. *sĭz'ĭ-jĭ*, SYZ'YGIES, n. plu. *-jĭz* [Gr. *suzŭgĭa*, a yoking together—from *sun*, together; *zugon*, a yoke; *zeugnumi*, I join]: the point at which the moon or a planet is in conjunction or opposition with the sun; the times of both new and full moon: in *Greek and Latin verse*, the coupling of different feet together. SYZYGY TIDE, the tide which takes place on the afternoon of the day the sun and moon are in syzygy.

SZAB'ADKA: see THERESIOPEL.

SZARVAS, *sŏr'vŏsh:* town of Hungary, county of Bekes, in a plain on the Körös, 22 m. n.e. from Csongrad. It has trade in corn and cattle. Pop. (1880) 22,504.

SZATMAR-NEMETI, *sŏt-mâr'nā-mĕt'ĭ:* in town of Hungary, on the Samos, 60 m. n.e. of Debreczin. Pop. (1880) 19,708; (1885) about 22,000; (1890) 20,736.

SZE-CHUEN, *sŭch-wân'* (Four Streams): vast province of w. China, and largest of the eighteen. Pop. about 69,000,000. The Kincha-kiang, or Golden Sanded River,' which rises in the s. slopes of the great Tibetan range, flows through S.; and after receiving several tributaries, it becomes, before leaving the province, the famous Yang-tze-kiang. In its course, it passes at right angles, and by narrow gorges, through a succession of ranges of hills. The people of S. cannot always force a subsistence from their stubborn soil; and famines occur in which whole families are starved to death, and thousands subsist on a mixture of rice, roots, and common earth. Coal is abundant, but of inferior quality; and gold is found in small quantities.

SZEGEDIN, *sĕg'ĕd-ĭn* or *-ēn':* one of the two or three largest towns in Hungary; 148 m. s.e. of Buda-Pesth, on both sides of the Theiss where it is joined by the Maros. It manufactures great quantities of soda, tobacco, coarse cloth, etc., has the largest wharves on the Theiss, and carries on extensive river-trade in wood and corn with Transylvania. Its markets rank next to those of Pesth and Debreczin.—S. was almost completely destroyed by a terrible inundation 1879, Mar. In this hardly paralleled catastrophe, of the 7,000 houses of the city, only 350 were left standing. The ruin to property was immense; the loss of life was stated at 2,000. The city has in large part been rebuilt. Pop. (1880) 73,675; (1885) estimated 76,000; all Magyars; (1890) 87,210; (1900) 102,991.

SZEGSZARD, *sĕch-sŏrd':* town of Hungary, near the right bank of the Danube, 80 m. s.s.w. of Pesth. Here excellent red wine is made. Pop. (1890) 14,325.

SZEN'TA: see ZENTA.

SZENTES, *sĕn-tĕsh':* market town in Hungary, 30 m. n. of Szegedin, near the left bank of the Theiss. The scenery is picturesque. Wine-culture is a chief industry.—Pop. (1880) 28,712; (1890) 30,758; (1900) 31,308.

SZOLNOK, *sŏl-nŏk':* town of Hungary, on the Theiss and the Zagyva, 66 m. e.s.e. of Pesth. It contains important salt-magazines, and is the centre of the traffic by steamers on the Theiss, and an important railway station. Pop. (1880) 18,247; (1885) about 19,000; (1890) 20,748.

T

T, or t: 20th letter in the English alphabet, a consonant, the sharp or mute of the lingual series, *t*, *d*, *th* (*dh*); usually classed also as a dental. It is produced by pressing the forepart of the tongue against the front of the palate. The name in Semitic (*Tau*) signifies a mark (in the form of a cross). The Semitic tongues had another *t*-sound, which became the Greek θ (*th*). This aspirated *t* is lacking in Latin and its derivatives; it is also foreign to High German, though the Gothic and other Low-German tongues (English) possess it: the Gothic *th* has become in High German *d*. In the *spelling* of High German, *th* occurs frequently; but it is never pronounced, and the introduction of it being considered by students of the language an aberration, there is a tendency to drop the *h*. There is evidence that in Latin, at an early period, *t* before *i* was sibilated so as to sound like *ts* or *z* (see letter C). Before *s*, *t* was frequently dropped; as *fons* for *fonts*, *sors* for *sorts*. Final *t* was in Latin pronounced but faintly, and inscriptions show that in popular speech it was often dropped; e.g., *fece* for *fecit*, *vixse* for *vixit*. Thus the modern Romanic languages have inherited from their common mother the loss of the pronominal ending *t*. In French, *t* between two vowels has been elided; e.g., *père*, *mère*, from *pater*, *mater*. In the corresponding words of the allied languages, *t* is often interchanged with other letters. T in Sanskrit, Greek, and Latin becomes *th* in Gothic and English, and *d* in High German; thus Lat. *tres* (Skr. *trayas*), Goth. *thrais*, Eng. *three*, Ger. *drei;* Lat. *tectum* (Gr. *tegos*), Goth. *thak*, Eng. *thatch* or *thack*, Ger. *dach;* Lat. *frater*, Goth. *brothar*, Eng. *brother*, Ger. *bruder*. In German, the *t* of the English is often represented by *z*, as Eng. *two* = Ger. *zwei;* Eng. *toll* = Ger. *zoll;* while German *t* or *th* becomes Eng. *d*, as Ger. *tag*, *thau* = Eng. *day*, *dew*. A more remarkable interchange is seen in Lat. *lacrima* = Eng. *tear*. See PHILOLOGY.

TAB, n. *tăb* [etym. doubt.]: latchet or flap of a shoe or half-boot, formerly fastened with a buckle, now usually by a string: the metallic binding on the end of a shoe or corset lace; a tag: a lace or other border, resembling that of a cap, worn on the inner front edges of ladies' bonnets: the hanging sleeve of a child's garment; in *fulling*, one of the revolving arms which lift the beaters of a fulling-machine.

TABANIDÆ, *tă-băn'ĭ-dē:* numerous family of dipterous insects, of section *Proboscideæ*, which live by sucking the blood of horses, oxen, and other animals, and are popularly known by the name GAD-FLY, which, however, is often given erroneously to some of the *Œstridæ* (see BOT). The insects called CLEG (q.v.) are of this family. The proboscis is exserted, and is generally terminated by two lips; the palpi also are exserted; the antennæ are three-

Gad-fly and larva (*Tabanus bovinus*).

jointed, the third joint consisting of a number of rings, and without a bristle. The larvæ are found in water or wet earth, and frequently penetrate the bodies of snails and beetles. The T. fly with buzzing noise. It is the female that bites; the male feeds on juices of plants. They are very annoying to cattle in the end of spring and in early summer; and where they abound, the skins of cattle are often streaked with blood from their bites. The Large Gad-fly (*T. bovinus*) is common in parts of the continent of Europe. The species are widely distributed. Some inhabit the deserts of Arabia and Africa, and in prodigious numbers attack camels. In N. America there are as many as 150 species. The Orange-belted Fly (*T. atratus* or *cinctus*), and the Green-headed Fly (*T. lineola*), known also as Greenhead, are common and very annoying, the latter on the n. New England coast especially.

TABARD, n. *tăb'ĕrd* [F. *tabard;* Sp. and Port. *tabardo;* It. *tabarro*, a wide loose overcoat]: garment in general use in the latter half of the 15th and beginning of the 16th c., which succeeded the *Jupon* and *Cyclas*. It was a tunic, fitting closely to the body; was open at the sides, had wide sleeves or flaps reaching to the elbow, and displayed the armorial ensigns of the wearer on the back and front, as well as on the sleeves. It was worn sometimes over armor. About the middle of the 16th c., the T. ceased to be used except by the officers at arms. TAB'ARDER, n. *-dĕr*, one who wears a tabard.

TABARET, n. *tăb'ă-rĕt* [see TABBY]: a material for furniture purposes resembling tabbinet, but having broad stripes of satin between broad stripes of watered material.

TABARI, Abu Jafar Muhamad ben Jarir at-, *ä'bô jä'-fĕr mô-häm'äd bĕn jä'rĭr ät-tä-bä-rē':* historian and Koranic exegete: 839–922; b. Amol in Tabaristan. Having studied in Bagdad under famous masters, he travelled through Syria and Egypt, and then settled in Bagdad, where he lived 40 years till his death. He wrote a great number of books, chief among which are the *Commentary on the Koran*, and the *Annals*. A.'s *Commentary* is of the highest authority in interpretation of the Koran: it exists complete in the Cairo library. The *Annals* purport to be a general history from the earliest time to the year 302 after the Hegira (A.D. 916). This work, covering more than 12,000 pages in the original, has been abridged, worked over, and continued by later authors. A complete copy of the original *Annals* is at Leyden.

TABASCO, *tä-bäs'kō:* state in the republic of Mexico; bounded n. by the Gulf of Mexico, e. by Campeachy, s. by Chiapa, s.w. by Oajaca, n.w. by Vera Cruz; lat. 17°—18° 40′ n., long. 91° 20′—94° 40′ w.; length 200 m., width 60 m.; 11,861 sq. m.; cap. San Juan Bautista. It is in general a flat region with vast expanse of primeval forest broken by large areas of very fertile soil; is well watered; has a hot and unhealthful climate; and produces maize, sugar-cane, cacao, coffee, and cotton. It is inhabited chiefly by Indians. Pop. (1879) 104,747; (1900) 158,107.

TABASHEER, n. *tăb-ă-shēr'* [Ar. *tabashir*, clay]: siliceous secretion sometimes found in the cavities or tubular parts of the stems of bamboos and other large grasses. It consists chiefly of silica, with a little lime and vegetable matter; or sometimes of silica and potash in the proportions of about 70 parts of silica and 30 of potash. It appears to be formed by extravasation of the juices of the plant, in consequence of some diseased condition of the nodes or joints. It is in high repute among the Hindus as a tonic, and is prepared by imperfect calcination and trituration. The powder is often chewed with betel, in order to renovate the constitution. There are several varieties of T.; one, very rare, is extremely beautiful, of delicate azure color by reflected light, and faint yellowish by transmitted light, easily crushed between the fingers, and of an aërial and substantial texture. Other varieties are yellowish, white, and much like some varieties of opal. T. is very porous, and absorbs water and oil very rapidly; effervescence taking place when it is plunged in water. By absorption of oil, the opaque varieties become transparent. When the greater part of the oil is expelled by heat, the structure of the T. becomes apparent; it is beautifully veined, the veins sometimes parrallel, sometimes curved. The optical properties of T. are remarkable: of all known substances, it has the lowest refractive power.

TABBINET, or TABINET, n. *tăb'bĭ-nĕt'* [see TABBY]. figured texture of a warp of silk and a weft of wool-yarn, like that in poplin; having the appearance of fine damask, and much used for window-curtains. It is usually enriched with diaper patterns.

TABBY, n. *tăb'bĭ* [F. *tabis;* Sp. *tabi;* mid. L. *attabi*—from Ar. *attabi*, a rich kind of watered silk, so called from a quarter of Bagdad, where first made]: old name for silk watered or figured (see MOIRE)—applied to worsteds rather than silks: mixture of lime, gravel, etc., and water, forming a mass which, when dry, becomes very hard: a cat of a tabby color: an elderly married or unmarried lady: ADJ. brindled with dark gray or black, like the waves of watered silk—applied to cats: V. to brindle; to cause to look wavy, as watered silk. TAB'BYING, imp.: N. the passing of silk, etc., under a calender to give it a wavy appearance. TAB'BIED, pp. *-bĭd.*

TABERN, n. *tăb'ĕrn* [L. *taberna*, a tavern]: a cellar.

TABERNACLE, n. *tăb'ĕr-năk-l* [L. *tabernac'ulum*, a tent—from *taber'na*, a hut]: movable or temporary habitation: the movable structure carried by the Israelites during their wanderings in the wilderness as a place for worship and sacrifices (see below): a place of worship: figuratively, the natural body of man; in *Rom. Cath. Chh.*, an ornamental erection on the altar for reception of the consecrated wafer (see below): V. to abide for a time; to lodge; to enshrine. TAB'ERNACLED, a. *-năk ld*, lodged. TAB'ERNAC'ULAR, a. *-năk'ū-lĕr*, pertaining to a tabernacle; in *arch.*, latticed. TAB'ERNAC'ULARLY, ad. *-lĭ.*

TAB'ERNACLE (Heb. *Ohel Moed* = tent of meeting, *scil.*, between God and man; LXX. *Skene*, Vulg. *Tabernaculum Fœderis*): the tent first erected by Moses in the desert as a portable sanctuary, the visible symbol of the Divine abiding in the midst of the people. It was the place where Moses went to receive his inspirations as their representative, when they 'came to seek Jehovah.' A cloudy pillar descended and stood at the door of the T., while 'Jehovah spake to Moses' (see Ex. xxv. seqq., xxxvi. seqq.). It was divided into the 'Sanctuary' proper—the front part, 20 cubits in length, 10 in width, and 10 in height—and the 'Holy of Holies,' 10 cubits square, and 10 high. A kind of court-yard, formed by curtains suspended between columns, surrounded the T., 100 cubits long, 50 wide. The entrance was toward the east—the rising of the sun—and was closed by another costly curtain, into which, as into the first covering, figures of 'cherubim' were woven. The surrounding court was much larger on this e. than on the w. side, for here the people assembled for worship. Here also stood the altar, of acacia-wood, with its perpetual fire, and the brazen laver. The *Sanctuary* contained the gilded table with the shewbread to the right, the golden candlestick with seven branches to the left; and between them the 'golden altar,' or 'altar of incense,' upon which the high-priest burned incense in the morning and evening. In the Holy of Holies, the holy ark, or Ark of the Covenant,

alone was kept: a chest of acacia-wood, plated with pure gold within and outside, containing the two tables of the Ten Commandments. On the top of it were the two cherubim facing each other; and between them was the symbolical presence of Jehovah (the Shechinah—q.v.).

Only once a year, on the Day of Atonement, the high-priest was allowed to enter the Holy of Holies; but the Sanctuary was the ordinary place of the priests, and the court that of the Levites. The tribe of Levi was also that to which was assigned the place nearest the T., around which the 12 tribes were grouped; also, the members of this tribe had the duty of conveying the structure from place to place during the migrations.

The T., after the people had settled in Canaan, was erected at Shiloh, where it was still found at the time of Saul, though the Ark of the Covenant itself had been carried away by the Philistines, in the time of Eli, and when restored, placed at Kirjath-jearim. The T. of Shiloh was not the only sanctuary, as it was intended to be. We find other local sanctuaries with priests—at Bethel, Nob, Sichem, Mizpah, etc.—at which even Samuel worshipped, as in legally instituted places. When David is reported to have removed the Ark from Kirjath-jearim to Jerusalem, nothing is said about the T. of Shiloh; on the contrary, David erected a new one on purpose for the Ark. It is conjectured that it had been removed to Gibeon.

TAB'ERNACLE, in the Roman Catholic Church: receptacle in which the consecrated elements of the Eucharist are retained. The name is derived by analogy from the T. of the Old Law, which, in general form, it resembles. By the present discipline, the T. is commonly a small structure of marble, metal, or wood, placed at the posterior part of the altar, and of costly workmanship. Even when the exterior is of marble or metal, there is usually an inner receptacle of wood (properly cedar), lined with silk. The tabernacle is appropriated exclusively to the reservation of the Eucharist, and it is prohibited to keep within it any other object, however sacred. A lamp is constantly kept burning before it; and the T. is to be kept carefully locked, the key being retained by the clergy, who are forbidden to intrust it to any lay person whomsoever.

TAB'ERNACLES, Feast of (Heb. *Succoth*, LXX. *Heorte skenon*, Vulg. *Feriæ Tabernaculorum*): Hebrew feast of seven days, beginning on the 15th day of the 7th month (Tishri, nearly corresponding with Oct.), instituted principally in memory of the nomad life of the people in the desert, and the booths or tents used on their march. Besides this signification, it also had an agricultural one, like the other two pilgrimage festivals, the Passah and the Feast of Weeks. It was emphatically the Feast of 'Ingathering'—i.e., the close of the labors of the field—the harvest of all the fruits, of the corn, the wine, and the oil. During this feast, the people were enjoined to dwell in booths, which, we learn from Neh. viii. 15, were made of olive, pine, myrtle, palm, and other branches, and were erected on the roofs of houses, and in the courts and

streets. The scriptural injunction, to take trees and 'boughs of goodly branches of palm-trees,' etc., was by tradition explained to mean a bunch made of palm, myrtle, and willow branches, and the esog-fruit, a species of citron, which the faithful carried in procession during these seven days in the Temple; while those who did not visit the Temple only said a benediction over it on the first day. The Sadducees and Karaites, however, demurred to this explanation. Special sacrifices, and a greater number of burnt-offerings than on any other festival, were offered up on this; and on it also the law was to be read to the people every seventh year. It was called emphatically *the* festival, and was the most joyous of all. There was especially, during the time of the Temple, the tumultuous 'joy of the libation,' consisting of the priest's fetching, during the morning sacrifice of each day, water from the well of Siloah, and pouring it out, with accompaniment of music and hymns. There was further a grand illumination in the evening in the court of women, which is said to have lighted up all Jerusalem; and during and after which there were dancing and singing. On each day the trumpets were sounded 21 times. At the end of the seven days' joy, an eighth day of solemn rest was celebrated, perfectly distinct from the other days in its sacrifices and in its general service; and a sin-offering was slaughtered—in expiation of possible transgressions during the previous hilarity.

Three distinct times was the inauguration of the Temple celebrated on this important festival, by Solomon, Ezra, and Judas Maccabæus; though the festival itself seems, from Neh. viii. 17, not to have been properly celebrated before the Exile. The observances of the booths and the harvest-bunches are still in force with the strict adherents of traditional Judaism, though the agricultural signification of the festival can be only a historical or poetical reminiscence. No festival could have been more apt to inculcate the fundamental principle of Judaism—the equality of all men—than this, which enjoined that every one should live for a time in primitive dwellings, without distinction of rank, station, or fortune, and should rejoice in the harvest, with the whole people of the land 'before Jehovah.'

TABERNÆMONTANA, n. *tăb'ĕr-nē-mŏn-tā'nă* [after Dr. *Tabernæmontānus*, a great physician and botanist] genus of interesting plants, ord. *Apocynāceæ*, bearing sweet-scented flowers. TABERNÆMONTANA UTILIS, *ū'tĭl-ĭs* [L. *utĭlis*, profitable]: cow-tree or milk-tree of Demerara: see COW-TREE: FORBIDDEN FRUIT.

TABES, n. *tā'bēz* [L. *tābēs*, a wasting away—from *tābĕō*, I melt or waste away]: gradual wasting away of the whole body, accompanied by languor and depressed spirits, without any apparent disease of the viscera. TABETIC, a. *tă-bĕt'ĭk*, or TABET'ICAL, a. *-ĭ-kăl*, affected with tabes; wasting by slow disease. TABID, a. *tăb'ĭd* [L. *tabĭdus*, wasting away]: wasted by disease. TAB'IDLY, ad. *-lĭ*. TAB'IDNESS, n., or TAB'ITUDE, n. *-ĭ-tūd*, state of being wasted by disease.

TABES DORSALIS, *tā'bēz dawr-sā'lis:* affection of the nervous system, now known as *locomotor ataxia.* For the distinctions between T. D. and *Paraplegia*, see PARALYSIS. The affection is characterized by a lack of power in harmonizing the action of certain muscles, the absence of such co-ordinating power being apparent first in the lower extremities, making the gait straggling and unsteady. There is no true paralysis, but sensitiveness is diminished, and neuralgic pains are felt in the legs and feet. The loss of power proceeds, and the later stages of the malady are marked by such symptoms as disordered vision, incontinence of urine, and exhaustion. The duration of this disease varies from a few months to several years. The *etiology* or *causes* of T. D. are obscure. A peculiar change in the posterior columns of the spinal cord, and in the posterior or sensory roots of the spinal nerves, accompanies it. Prolonged exposure to cold and damp, drunkenness, sexual excesses, masturbation, etc., have been regarded as causes. It is alleged to be more common in men than in women, and subjects between the ages of 30 and 50 are said to be most liable to it. The patient has an unsteady gait, and walks like a drunken person, but soon recovers his bearing in some degree. A difficulty in carrying out the intents of the will is experienced, and in picking up an object one hand is employed to steady the other. When the eyes are shut, the patient walks with extreme difficulty. T. D. may be distinguished from disease of the cerebellum by absence of the characteristic pain at the back of the head, and vomiting. The progress of T. D. may be retarded, but the prospect of cure is nearly hopeless. The *treatment* is limited to improvement of the general health: warm clothing, nutritious food, and rest are the chief items; and opiates are indicated for relief of the neuralgic pains. Sulphur baths have been prescribed in the earlier stages, and constipation should be alleviated.

TABINET, n. *tăb'ĭ-nĕt':* see TABBINET.

TABLATURE, n. *tăb'lă-tūr* [F. *tablature*, arrangement of marks on a line (see TABLE)]: a painting or basso-rilievo on a wall or on a ceiling, forming a single piece comprehended in one view and formed according to one design; in *anat.*, a division or parting of the flat bones of the skull into two tables: a mode of writing music for the guitar and other instruments, now long disused.

TABLE, n. *tā'bl* [F. *table*—from L. *tabŭla*, a board]: piece of domestic furniture, consisting of a flat surface supported on one or more legs: a flat surface in general: persons sitting at table; the fare or entertainment itself: a circular sheet of finished glass: a collection of particulars, numbers, results, etc., arranged in order and brought into one view: in *arch.*, any smooth ornament, usually that of a long square: the Ten Commandments, consisting of two tables; in *OE.*, that which exhibits a view of a thing on a flat surface; in *palmistry*, lines of the hand; in *plu.*, small pieces shifted on squares or points; draughts; backgammon: ADJ. pertaining to a table: V. to lay or place

upon a table; to enter upon the record; to board, etc.; in *OE.*, to make into a catalogue; to set down; to supply with a table or food. TA BLING, imp.: N. in *shipbuilding*, the letting of one piece of timber into another. TABLED, pp. *tā'bld.* THE LORD'S TABLE, the communion of the Lord's Supper; the Eucharist; also the table itself in the Eng. Chh. TABLE-BEER, weak beer for common use. TABLE-BOOK, book on which anything is impressed or written without ink; tablet. TABLE-CLOTH, covering of linen, etc., for a table, particularly at meals. TABLE-LAND, in *phys. geog.*, any flat or comparatively level tract of land considerably elevated above the general surface of a country; a plateau (see TABLE-LANDS). TABLE-LINEN, the linen used for and at the table. TABLE-MONEY, allowance granted to general officers in some European armies and navies, to enable them to fulfil the duties of hospitality proper to their station. TABLE-SPOON, the ordinary large spoon used at table. TABLE-TALK, familiar conversation at meals. TABLE-TURNING, movements of tables attributed to the power of departed spirits, or to the development of latent forces whether spiritual, vital, or material (see SPIRITUALISM). TO LAY ON THE TABLE, in parliamentary usage, and in the usage of corporate and other bodies, to receive any document or written communication, as a report, a motion, and the like, while agreeing to postpone its consideration indefinitely. TO SERVE TABLES, in *Scrip.*, to administer the alms of the church, a duty assigned to the deacons. TO TURN THE TABLES, to change the condition or fortunes of contending parties. TABLE D'HÔTE, n. *tā'bl dōt* [F., table of the landlord]: dinner for the whole company of guests together at a hotel or tavern—constructively with the landlord presiding; an ordinary. TWELVE TABLES, celebrated body of anc. Roman laws. TWO TABLES, two stone tablets on which the Ten Commandments were written, the first with four containing duties to God, the second with six containing duties to man. KNIGHTS OF THE ROUND TABLE, military order of the anc. British king Arthur (q.v.).—SYN. of 'table, n.': tablet; index; catalogue; syllabus; synopsis.

TABLEAU, n. *tăb'lō*, TABLEAUX, n. plu. *tă-blō'* or *tăb'lōz* [F. *tableau*, a picture, a painting—from a supposed mid. L. *tabulellum*, a dim. of L. *tabŭla*, a table]: a striking and vivid representation. TABLEAUX VIVANTS, *tăb'lō vē'văng* [F., living pictures; *vivants*, living]: an exhibition in which one or more persons in appropriate costume represent some interesting historical scene, or character in fiction, or some celebrated painting or statuary. They are said to have been invented by Madame de Genlis when she had charge of the education of the children of the Duke of Orleans. Some writers on æsthetics declare them opposed to just principles of taste.

TA'BLE-LANDS, or PLATEAUX, *plă-tōz'*: extensive plains at a considerable elevation above the sea; whose boundaries are either ranges of mountains, much higher on the side away from, than on the side next to, the table-lands, or steep acclivities, sloping from the plateaux to the surrounding country. Many T.-L. are traversed by mountain chains; and some even lose the character of plains, being rather conglomerations of hills. In N. America, the chief table-lands are in Oregon, the great basin of Utah (elevation 4,500 ft.), Colorado plateau (6,000 ft.), Mexico plateau (8,000 ft.), central plateau of Brit. Col. (2,000 ft.), and the great plains of the Columbia river (2,000 ft.): in S. America, n. and central Brazil: in Africa, the interior of Barbary. In Asia, almost the whole s. and centre of the continent consists of plateaux which rise terrace above terrace till they culminate in that of Tibet, and average 10,000—16,000 ft. Of the Asiatic plateaux, the principal are: that of Asia Minor (3,280 ft. above sea-level), Armenia (7,000 ft.), Persia or Iran (3,000 ft.), Mysore (4,000—5,000 ft.), Deccan (1,500—2,000 ft.), Tibet (12,000—17,000 ft.), and Chinese Tartary (3,000—4,300 ft.). These T.-L. are generally accounted for by the supposition of a more extensive and uniform action of the upheaving force than that which produced mountains; and there are satisfactory indications of such more uniform action in quite recent periods.

TA'BLE MOUNTAIN, or TA'BLE MOUNT: see CAPE TOWN.

TA'BLES, LUNAR: tabular lists of the values of the elements of the moon's orbit, as planetary tables are lists of the elements of the planets' paths. Also the term is used occasionally to denote the tabulated angular distances of the moon from certain stars at fixed epochs, as given in the *Nautical Almanac* (q.v.). See LATITUDE.

TABLET, n. *tăb'lĕt* [F. *tablette*, a shelf, a dim. of F. *table* (see TABLE)]: a small flat surface of any material, anciently used for memoranda; something flat used for writing, painting, or drawing on; a small flattish cake, as of soap; a flat piece of sweetmeat; in *China*, a wooden or stone representation of the dead; an ancestral monument.

TABLIER, n. *tăb'lĭ-ĕr* or *tăb'lĭ-ā* [F. *tablier*, an apron]: a large apron worn in front to preserve the dress while working; an over-skirt, but much shorter, fastened at the waist behind.

TABOO, n. *tă-bō'*: in the *Pacific Isles*, a system of religious prohibitions, applicable to all kinds of things, persons, or actions (see below): V. to forbid the use of; to render inviolable; to forbid approach or use; to interdict. TABOO'ING, imp. TABOOED', pp. *-bōd'*.—*Taboo*, or *Tabu*, or *Tapu*, *tă-pō'*, or *Tambu*, *tăm-bō'* (in New Zealand, usually *Tapu*), is a Polynesian term, denoting an institution universal in the Polyesian Islands and in New Zealand. Its primary meanings seem exactly the same as those of the Hebrew *to'ĕbah*. This word, like Gr. *anathema*, Latin *sacer*, and F. *sacre* (and similar terms in most lan-

guages), has a double sense—a good and a bad; on the one hand, consecrated; on the other hand, accursed. It results from a thing being held sacred, that certain acts are forbidden with reference to it, and from any act being deemed abominable, that it is forbidden; a notion of prohibition thus attaches to the word T. The term is often used substantively in the sense of a prohibition, a prohibitory commandment. If a burial-ground has been consecrated, it is T.; to fight in it is then sacrilegious and prohibited, and this also is T.; moreover, those persons are T. who have violated its sanctity by fighting in it, and they are, loosely and popularly, said to have broken the T. This example illustrates all the uses of the word. It has furnished to the English language the now familiar phrase of being 'tabooed'=forbidden.

The extent to which, among the Polynesians and New Zealanders, things and acts are T. is almost incredible. The prohibitions divide into two classes: one, of traditional rules, acting through religious terror equally on chiefs and people; the other, of prohibitions imposed from time to time for maintaining the authority of the chiefs. Those of the first class are by far the most remarkable; and of these the most important are those bearing on sacred things, those relating to the person of the chief, and those relating to intercourse between relatives.

Any house or piece of ground consecrated to a god is T., and thus affords inviolable shelter to men fleeing from an enemy. *A fortiori*, all temples are T. To come in the way of a funeral procession is severely T., for it is believed that the gods accompany the procession. Again, to touch the person of a chief, is T. to his inferiors; also, to touch anything belonging to him, to eat in his presence, to eat anything he has touched, or to mention his name. The interdict on family intercourse varies in extent in different places. In the Tonga Islands, it was T. to mention the name of father, mother, father-in-law, mother-in-law; also to touch these relatives, to eat in their presence (unless with the back turned, when constructively the person was not in their presence), or to eat anything which they had touched. In the Fiji Islands, generally, it is T. for brother and sister, first-cousins, father-in-law and son-in law, mother-in-law and daughter-in-law, brother-in-law and sister-in-law, to speak together, or to eat from the same dish: husband and wife, too, are forbidden to eat from the same dish. In some places, a father may not speak to his son after he has passed his 15th year.

The traditional T. also supplies to some extent the place of laws and a police: in many places, exposed property of some kinds is always under its shelter.

The chiefs have large discretionary power of declaring articles or actions T.; indeed, their power is unlimited, but they are expected to keep within precedent. In many cases, they use it for public purposes—thus, when a feast is coming on, they lay a T. on pigs and nuts, and other articles, that there may be abundance for the feast. The T. is obviously a powerful instrument of government.

When a man has accidentally infringed the T., he may be, in some cases, freed from the state of T. by a ceremony called *moë-moë;* in other cases by a ceremony called *Fota;* in other cases by sacrificing to the offended god. A person, when he is T., must not use his hands in feeding himself or in working; were he to feed himself, it is believed that he would die; he must be fed by others until the T. is removed. In many cases, the T. can be removed only by time. Thus, a common person, who has touched a dead chief, remains tabu for ten lunar months. In several cases, breach of T. is punished with death; in many, it involves a sort of outlawry.

It is obvious that the effect of breaking a T. is to produce uncleanness: the offender has done something unholy, accursed; he must make atonement or undergo purification. The chief, recognized as a semi-divine person, descended from the gods, is the medium of purification; he has authority to loose as well as to bind. The offense is not, in general, an offense against any particular god; its punishment is looked for from the supernatural powers. T. is certainly older than most of the Polynesian gods; it must have existed for ages before the mythologies took their present shapes. It has no connection with fetichism. The Polynesians do not worship natural objects; their belief that certain plants and animals are the shrines of gods, would naturally lead to the worship of those; but in fact, they merely do not eat the plant or animal which is the shrine of their tutelary god.

The origin of T. seems a vague fear of superhuman powers; this has become associated with certain things and acts; thus practically, T. is a system of divinely appointed restraints—religion, in the primary sense of the word. This religion the chiefs and priests have for ages administered as a government, to which their avarice and ambition have given development and extension.—The underlying principle of T. is traceable in the requirements set forth by various religions in widely separated parts of the world.

TABOR, *tā'bĕr:* celebrated mountain of n. Palestine, rising solitarily 6 or 8 m. e. of Nazaraeth, in the n.e. part of the great plain of Esdraëlon, to about 1,000 ft., and commanding the most extensive and probably the most magnificent prospect in the Holy Land. Eastward, the eye catches a gleam of the waters of the Galilean Sea, 15 m. distant; while the whole picturesque outline of its deep-sunken basin, of the rolling trans-Jordanic plateau, and the course of the sacred river itself, is clearly traceable; westward, stretch away into the dim horizon the rich plains of Galilee, rising into the dark green ridges of Carmel, overhanging the Levant; on the n. and n e., the snow covered heights of Hermon (see LEBANON, MOUNT) glitter pale over the intervening hills; while to the s., the view embraces the fatal heights of Gilboa and the confused landscapes of Samaria. Mt. T. is now thickly clad with forests of oak, pistacias, etc., the haunt of wolves, wild-boars, lynxes, and various kinds of reptiles. Its beauty alone would insure it

distinguished mention among the mountains of Palestine, but it owes its celebrity rather to the tradition of its having been regarded from an early period as the Mount of Transfiguration. This opinion is now almost abandoned, as there is strong evidence of its summit having been then occupied by a city. In the times of the Crusaders, T. was studded with churches and monasteries, relics of which, as well as of Roman and Saracenic structures, still remain. The modern name of T. is *Jebel-et Tûr*.

TABOR, n., or TABOUR, n. *tā'bĕr* [OF. *tabour;* F. *tambour;* Sp *tambor*, a drum: Ar. *tambûr*, *tabl*, a drum: the sound of a blow is generally represented by such syllables as *tab*, *tap*, *dab*, *dob*, *top*]: small drum beaten with one stick, used as an accompaniment to a pipe or fife; it is no longer used in war, being replaced by the kettle-drum: V. to play the tabor; to strike lightly and frequently. TA'BORING, imp. TA'BORED, pp. *-bĕrd*. TA'BORER, n. *-bĕr-ĕr*, one who plays on the tabor. TABORET, n. *tăb'ō-rĕt* [F.]: a small tabor; a cushioned stool highly ornamented; an embroidery-frame. TABORINE, n. *tăb'ō-rēn*, in *OE.*, a common side-drum. TAB'RET, n. a small tabor.

TABORITES, *tā'bĕr-īts:* a sect of the Hussites in Bohemia: named from their fortress of Tabor, near the river Luschnitz, affluent of the Moldau, 49 m. s.s.e. of Prague. There is now a small town at the place (pop. 6,717).—The first leader of the T. was John Ziska (q.v.) of Trocynow. Under him was Nicolas von Hussinecz, who repelled the imperial army from Tabor 1420. The Calixtines (q.v.), desirous of the peace of the country, offered the throne of Bohemia first to King Ladislas of Poland, then to the grand duke Witold of Lithuania, afterward to his brother Coribut. Ziska refused his consent, and thus these parties became completely separated. In 1420–1, both of them set forth their creed in a number of articles. The T. absolutely rejected all ordinances of the church not expressly appointed in the Scriptures. Both parties were united by common danger in opposition to a common enemy. In 1422, Ziska defeated the imperialists at Deutschbrot, and thereafter with uninterrupted success in a number of minor conflicts; and in 1424, Prague was saved from destruction only by submitting to hard terms of peace. After Ziska's death, Procop (q.v.) the Greater, or Procop Rasa (the Shaver), and Procop the Less were their leaders. In 1427 and 31, they gained great victories at Miess and Tachau over the mercenary crusaders of the German empire, and till 1432 their incursions were the dread of the neighboring countries. The Council of Basel, finding them still unconquered 1433, proceeded to treat with them; and the Calixtines entered into an arrangement, known as the *Prague Compact*, which, however, was despised by the T. and the Orphans, as that section of the T. who considered Ziska as irreplaceable had come to be termed. The T. and Orphans were completely defeated at Böhmischbrot 1434, May 30, by the now united forces of the Rom. Catholics and the Calixtines. In the treaty of Iglau, 1436, Emperor Sigismund confirmed the compact, and promised

religious and political liberty. The civil war, however, continued till King Ladislas in the Diet at Kuttenberg 1485 established a religious peace, securing both Rom. Catholics and Calixtines in their possessions. The T. were eventually lost in the sect of Bohemian Brethren (q.v.) which arose from among them.—See HUSSITE: UTRAQUISTS.

TABRIZ, or TABREEZ, *ta-brēz'*: great and ancient city of Persia, cap. of the province of Azerbijan, 40 m. e. of Lake Urumiah, and on the Aji, which flows s.w. into that lake. The town is surrounded by a ditch and a brick wall, pierced by 7 gates. It forms an oblong of gardens and houses, 2½ m. long; is more than 4,000 ft. above sea-level, yet appears shut in by mountains. The streets are broader and cleaner than in most eastern cities, but they are flanked as usual by the pits from which the earth required for their houses was taken; the houses are infested with noxious insects; and the bazaars are roofed with sticks, and are dark and dirty. Water is comparatively plentiful. Perhaps the principal architectural feature of the town is the fine ruin, Kabúd Masjid, or 'blue mosque,' about 300 years old, and in part covered with blue tiles beautifully arabesqued. The citadel is a spacious edifice of burned brick, whose walls have been cracked by earthquakes. Gen. Schindler (1886) stated that there were in T. 318 mosques and 5 Christian (Armenian) churches; also 100 public baths. —T. is the seat of a varied industry, in which leather and silk manufactures and gold and silver smith's work are important; in recent years it has become also the emporium of an extensive trade. Smuggling is rife here, and along the whole Russo-Persian frontier of Azerbijan. Chief imports are cotton fabrics, sugar, woolen cloth, and wines and spirits. Chief exports are cotton cloths, drugs and spices, dried fruits, shawls, carpets, and raw silk. Value of imports (1885), $3,511,216; exports $1,492,032. The Anglo-Indian telegraph line passes through the city.

T., anc. *Tauris*, became the cap. of Tiridates III., King of Armenia, 297, and was probably at that time an old city. In 791, it was enlarged and greatly embellished by Zobaidah, wife of Harûn-al-Raschid. In 858, and again 1041, the city was devastated by an earthquake. It was taken and sacked by Timur 1392, and was soon after seized by the Turkomans, from whom it was taken by the Persians 1500. In 1721 it was again visited by a dreadful earthquake, when 80,000 persons are said to have perished. It has been several times in the hands of the Turks, but was finally taken from them by Nadir Shah 1730. T. is a city of Turks, and Turkish is the language spoken. Pop. (1891) estimated about 180,000.—Eastwick's *Three Years' Residence in Persia* (Lond. 1864), and *Commercial Reports from Her Majesty's Consuls* (1878).

TABULÆ, n. plu. *tăb'ū-lē* [L. *tabŭla*, a board or plank]: horizontal plates or floors in some corals, across the cavity of the theca. TABULAR, a. *tăb'ū-lėr*, having a flat or square surface; having the form of laminæ or plates; set down in the form of tables or synopses. TAB'ULATE, v. *-lāt*, to shape with a flat surface; to reduce to tables or synopses. TAB'ULATING, imp. TAB'ULATED, pp. TAB'ULATOR, n. *-lā-tėr*, one who tabulates. TAB'ULATION, *-lā'shŭn*, the act of throwing data into a tabular form. TABULAR SPAR, a mineral, called also *wollastonite*, occurring chiefly in broad, prismatic, or tabular masses, of a grayish-yellow or reddish-brown color, having a vitreous or pearly lustre, and consisting of silicate of lime.

TABULA RASA, phrase *tăb'ū-la rā'sa* [L. smooth waxed tablet, ready to receive any impression of the style]: in *philos.*, term used by the sensational philosophers of the 17th c. to describe the condition of the human mind before it has been the subject of experience, in opposition to the supporters of the theory of innate ideas.

TACAHOUT, *tăk'ă-hôt:* Arabic name in Algiers for the small gall formed on the Tamarisk tree, *Tamariscus Indica.* These galls have become important as a source of gallic acid for use in photography. The same gall, from India, under the name Mahee, is used for the same purpose.

TACAMAHAC, n. *tăk'ă-mă-hăk*, or TACAMAHA'CA: name applied to various resins, used chiefly as varnishes. One from Mauritius, is obtained from a tree common in India and its islands, the Poon-wood Tree, *Calophyllum inophyllum.* Another, from S. America and the W. Indies, is obtained from *Zanthoxylum* (*Fagura*) *octandra*—this is usually called Shell Tacamahac. A third, also from S. America, is yielded by a tree called *Icica tacamahaca;* it is supposed to be the Mexican Copal. A fourth is from N. America, the produce of a species of Poplar (see POPLAR—*Balsam Poplar*).

TACCA, n. *tăk'kă* [native Malay name]: genus of tropical plants of nat. order *Taccaceæ*, nearly allied to *Araceæ.* They are large perennials with tuberous roots. The species are few, and are found in maritime places and wood in the South Sea Islands and warmest parts of Asia and Africa. Some (*T. pinnatifida*, etc.) are much cultivated for their tubers, which are used as food, though they are acrid, and require maceration in water to remove their acridity, and are eaten usually with vinegar or some acid. They contain a large quantity of starch, which is wholesome and nutritious, and is exported as substitute for W. Indian arrow-root: it is known as *Tahiti Arrow-root.* It has been said to be a cure for dysentery, which other arrow-root is not.

TACE, *tā'sē*, or TACET, *tā'sĕt* [L. *tacĕ*, be silent; *tacet*, it is silent]: in *music*, a term used to indicate when a part is to be silent during a certain time.

TACHE, n. *tăch* [see TACK]: a button; a catch; a loop.

TACHE, n. *tăsh* [F.]: in *OE.*, a stain; blemish.

TACHÉ, *tâ-shā'*, ALEXANDER ANTONINE, D.D.: Roman Catholic archbishop: 1823, July 23—1894, June 22; b. Rivière-du-Loup, Can. He made his literary studies in the Coll. of St. Hyacinth, and studied theol. in the seminary of Montreal. He then entered the order of the Oblates, and was appointed missionary to the Indians of the N. W. Territory 1846. After 5 yrs. of exemplary devotion to his work among the scattered tribes, he was consecrated bp. 1851, and fixed his residence at Ile-à-la-Crosse. He promoted the settlement of the Red River country with French Canadians; and has been a courageous defender of their rights, as also of the rights of the Indians and half-breeds. T. became abp. of St. Boniface 1871. He was author of *Vingt années de missions dans le nord-ouest de l'Amérique.*

TACHOMETER, n. *tă-kŏm'ĕ-tĕr* [Gr. *tachos*, speed; *metron*, a measure]: contrivance for indicating small variations in the velocity of machines, also for measuring velocity of running water.

TACHY-, prefix *tăk-ĭ-* [Gr. *tachus*, swift]: attended with swiftness; endowed with speed.

TACHYDROMIAN, n. *tăk'ĭ-drō'mĭ-ăn* [Gr. *tachus*, swift; *dromos*, a course, a running]: one of a family of wading birds; one of a family of saurian reptiles, also of dipterous insects.

TACHYGRAPHER, n. *ta-kĭg'ra-fĕr* [Eng. *tachygraphy*]: one who writes in shorthand; a stenographer. TACHYGRAPHIC, a. *tăk-ĭ-graf'ĭk*, TACHYGRAPHICAL, *-al*, of or pertaining to tachygraphy; written in shorthand. TACHYGRAPHY, n. *ta-kĭg'ra-fĭ* [Gr. *tachus*, swift; *graphō*, I write]: act or art of rapid writing; shorthand; stenography.

TACHYLITE, n. *tăk'ĭ-līt* [Gr. *tachus*, quick; *lithos*, a stone]: a black vitreous mineral of the hornblende family, so called from its being easily fused under the blowpipe.

TACIT, a. *tăs'ĭt* [F. *tacite*—from L. *tacĭtus*, silent; *tacēre*, to be silent: It. *tacito*]: implied but not expressed in words; silent, as a *tacit* agreement. TAC'ITLY, ad. *-lĭ*, silently; without giving expression to in words. TACIT RELOCATION, in *Scotch law*, phrase to express the legal doctrine that when a tenant continues in possession of premises after his lease or term has ended, there is an implied or tacit renewal of the lease.

TACITURN, a. *tăs'ĭ-tĕrn* [L. *tacĭturnus*, of few words —from *tacĭtus*, silent; *tacēre*, to be silent]: close or reserved in speech; habitually silent. TAC'ITURN'ITY, n. *-ĭ-tĭ*, habitual silence or reserve: in *Scotch law*, mode of extinguishing an obligation by the mere silence of the creditor through a sufficiently long time. TAC'ITURNLY, ad. *-lĭ*.

TACITUS, *tăs'ĭ-tŭs*, CAIUS (or PUBLIUS) CORNELIUS: famous Roman historian: conjecturally about A.D. 53–117 or later. Concerning his parentage, date and place of birth and death, and even his first name, we have little more than conjecture and inference. From the emperors Vespasian, Titus, and Domitian, he received promotion and other marks of favor; and in 78 he married the

daughter of Caius Julius Agricola. In 88, when Domitian was emperor, and T. pretor, he assisted as one of the quindecemviri at the celebration of the *Ludi seculares.* Agricola died in Rome 83, while T. and his wife were absent; and nothing further is known of the historian till 97, when, in the reign of Nerva, he was appointed consul suffectus, succeeding T. Virginius Rufus, whose funeral oration he delivered. T. had already attained distinction as an orator when the younger Pliny was entering public life; and both of them were appointed, in Nerva's reign, in 99, to conduct the prosecution of Marius, then proconsul of Africa. T. became one of the most intimate friends of Pliny, of whose letters 11 are addressed to him. His extant works are: (1) *Vita Agricolæ,* written after the death of Domitian 96, universally admired as a masterpiece of noble sentiment and pregnant epigram. (2) *Historiæ,* written after Nerva's death 98, and before the *Annales,* and embracing the period from the second consulship of Galba 68 to the death of Domitian 96. Only the first four books have reached us in a perfect state, but there must have been many more. (3) *Annales,* from the death of Augustus 14 to the death of Nero 68: these also have reached us in an imperfect state. (4) *De Moribus et Populis Germaniæ.* This treatise is trustworthy only as regards those Germans best known to the Romans from their proximity to the Rhine: for the provinces beyond that river, it has no value geographical or political. (5) *Dialogus de Oratoribus,* if the work of T. at all, must be his earliest.—T. is one of the greatest of historians. In love of truth and integrity of purpose, he is equalled by few; in conciseness of phrase and power of saying much and implying more in one or two strokes of expression, he is scarcely rivalled; in occasional obscurity and rhetorical affectation, as well as in positive genius, he has been compared to Carlyle. The best editions are those of Orelli, Halm, Haase, and Nipperdey (1876).

TACK, n. *tăk* [Ir. *taca,* a peg, nail, fastening: Gael. *tacaid,* a tack, peg: Bret. *tach,* a small nail: Ger. *zacke,* a jag, a prong: Low Ger. *takk,* a point, a tooth]: very small nail with flat head: a slight fastening: in *nav.,* the course of a ship with reference to the position of the sails; the rope which fastens the foremost corner of the sail to the windward side of a ship, which is said to *tack,* in going against a wind when the *tack* is changed from one side to the other (see below): addition or supplement, as to a bill passing through parliament; in *Scots law,* a lease of land: V. to attach or fasten slightly; to stitch together; to unite; to join; to change the course of a ship by shifting the tacks and position of the sails; in *parliament,* to add a supplement to a bill in its progress through the houses. TACK'ING, imp.: N. act of changing a ship's course (see below): very long stitches in needle-work to keep two pieces of material together, till they can be stitched closely. TACKED, pp. *tăkt.* TACK'ER, n. *-ĕr,* one who makes an addition or supplement. TACKET, n. *tăk'ĕt,* in *Scot.,* a small short nail with a thick head. TACKS'MAN, n. in *Scot.,* one who holds a lease of

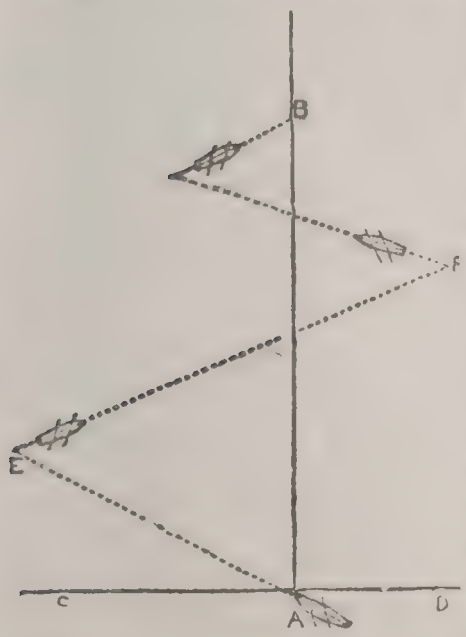
land, etc., from another; a lessee. TACKING OF MORTGAGES, in *Eng. law*, act of a third mortgagee, who became so without notice of a second incumbrance, and who afterward purchasing the first mortgage also, of right tacks one to the other, and so obtains priority for the third mortgage over the second. ON THE STARBOARD TACK, having the wind on the right side, said of a vessel in sailing (see LARBOARD). TO BEAR TACK OF HOLD TACK, in *OE.*, to hold out; to last.

TACKET, n. *tăk'ĕt:* see under TACK.

TACKLE, n. *tăk'kl* [Dan. *takkel;* Sw. *tackel;* Dut. *takel*, tackle, fittings of a ship. W. *tacl*, a tool, tackle]: among *seamen*, a pulley of two or more blocks, with suitable ropes, for raising and lowering heavy weights; the ropes, rigging, etc., of a ship; harness; gear; apparatus: in *OE.*, weapons; instruments of action: V. to supply with tackle; *familiarly*, to attack vigorously, as any labor. TAC'KLING, imp. *-kling:* N. furniture of the masts; instruments or apparatus. TACKLED, pp. *tăk'kld;* ADJ. made of ropes tacked together. GROUND-TACKLE, anchors, cables, and the like. FISHING-TACKLE, the apparatus used for fishing. GUN-TACKLE, the apparatus for the management of guns on board ship.

TACK—TACK'ING: terms much used in navigation. The *tack of a sail* is the lower windward corner. The *tack* is the rope employed in hauling down that corner to its proper position. The *tack* of a fore-and-aft sail is its lower forward clue or corner; also, the rope for hauling down that corner. A ship is said to be on the *starboard tack* when she is close-hauled with the wind on the starboard side; and on the *port tack* similarly with the wind on the port side.

Tacking is beating up against an adverse wind by a zigzag course. If a vessel at A require to sail due n. to B, and if the wind be either n. or from any point n. of the line CAD, it is obvious that the wind will not carry her directly to her destination. As an extreme case, let the wind be n., or dead against her. By setting her sails obliquely, as at A, it will be possible to beat up in the direction AE. If the master consider that at E he has passed sufficiently from his straight course to B, he will then put his helm a-lee, which brings the ship's head straight to the wind, the tacks of the sails being at the same time set free. The after-sails are then smartly braced over to the opposite side, and the ship's head falls off from the wind in an opposite direction to that previously held, until the course is EF. This process is repeated on each



side of the line AB, until at length the ship makes her port, B. The length of each tack, as EF, is called a *board.* When the wind is straight ahead, as in the above example, the several boards should obviously be equally on each side of the line AB. If, however, the wind were not so direct, it would be necessary that the boards in one direction should be shorter than those in the other. Sometimes, from the nature of the channel, it is necessary to take a long tack one way, say to starboard, and a very short one to port. This is known as 'sailing with a long and a short leg.'

TACKY, a. *tăk'ĭ* [*tack,* to fasten, etc.]: sticky; tenacious.

TACNA, *tâk'nâ:* former province of the s. dept. (Moquegua) of Peru. In the treaty of peace (1883, Oct. 20) following the war with Chili, Peru ceded the provinces of T. and Arica to Chili for 10 years, agreeing that the provinces should then decide by popular vote whether they would return to the jurisdiction of Peru or remain with Chili. Pop. (1896) 50,449. The cap. has pop. 11,000.

TACOMA, *tâ-kō'mâ:* city, cap. of Pierce co., Wash.; on Commencement Bay, at head of navigation on Puget Sound; w. terminus of the N. Pacific railroad. It has one of the best harbors in the world, with steamship communication with all ports on the Pacific coast and with the Orient, and nearly 4 m. of improved wharves; and has railroad shops and car-works for more than 1,000 m. of road. In 1889 the N. Pacific railroad company voted $6,000,000 to be expended in T., within three years, in terminal improvements. City had (1902) costly water gas and elec. light works; excellent sewerage; 20 hotels; 20 public-school buildings (7,479 enrolled pupils); Annie Wright Seminary; Washington College; Methodist Univ. for the Pacific Northwest; 70 churches; 2 parks, one of 662 acres; 4 hospitals; chamber of com. bldg.; gen. offices of the railroad co. (bldg. cost $150,000); 80 m. of city and suburban st. railroad completed and under construction; 4 pub. halls; theatre; 3 nat. banks (cap. $500,000); 1 savings bank, 3 state banks; 3 trust companies (capital $575,000), 1 branch of an English bank (home cap. $5,450,000); and 1 investment company; and 2 daily, 8 weekly, 7 monthly, and 1 quarterly periodicals. There are 12 saw-mills—one the largest in the n.w., with capacity of 400,000 ft. per day—output of all mills about 1,000,000 ft. per day; 11 iron-foundries, besides those connected with the railroad shops; several shingle-mills; tile and terra-cotta works; iron and stove works; furniture, soap, broom, cracker, oatmeal, box, and cement factories; several breweries; ice and refrigerating works; 5 large flour-mills; several grain warehouses and grain elevators; and 3 shipyards. The exports for 11 months in 1901 were valued at $20,000,000; imports at $10,350,000. The foreign shipments of wheat (1901) were 10,000,000 bushels, flour 850,000 barrels, lumber shipments by water (1900) 81,238,111 feet;

shipments of coal (1901) 850,000 tons; tea imports 9,360,219 pounds; vessels cleared 699; outward registered tonnage 934,676. There were 381 manuf. estab. which emp. 4,347 hands, paid $2,356,028 wages, and received $12,029,497 for products. The assessed value of city prop. was (1902) $21,743,515; bonded debt $3,823,000. T. is the only point on Puget Sound at which cargoes of tea and oriental goods for transhipment e. have been received. Within 30 m., in the foot-hills of the Cascade Mountains, are immense beds of bituminous coking coal, now being systematically worked; and near are large deposits of iron ore. Between T. and the mountains, and between the Puyallup and Nesqually rivers, are large tracts of rich farming-land, notably adapted to fruit, hay, hops, and vegetables; and the White River and Puyallup valleys produce the finest hops in the country. Pop. (1880) 1,098; (1890) 36,006; (1900) 37,714.

TACONIC MOUNTAINS, *tā-kon'ik*, or TAGHKANIC, *tăk'hon-ik*: name applied e. of Hudson river, and in Conn. and Mass., to a subordinate range of the Appalachian system. It is a continuation of the Highlands, which cross the Hudson below Newburgh, and it curves through the s.e. part of Dutchess co., thence n. coincident with the w. line of Conn. and Mass., and through central Vt., in which last state, however, it is known as the Green Mts., as are also the mts. in Mass. between the more easterly Hoosac ridges and the Connecticut river. Its acclivities are not usually abrupt, but suited to forest and to upland cultivation. It is characterized by scenery pleasingly diversified. Its rocks are mostly slate and limestone, affording marble, as at Stockbridge, Mass., and valuable iron ores in N. Y. and Conn.; also manganese. The dip of the rocks is in general 30°—50° east. Their age was a subject of great controversy for many years: see TACONIC SYSTEM. The highest peaks are Mt. Washington, in the s.w. corner of Mass., 2,624 ft., and Greylock, in the n.w. corner, 3,600 ft., otherwise known as Saddle Mt. or Saddle-back.

TACONIC SYSTEM: term applied to rocks of the Taconic Mountains, and now significant only of a long and famous controversy as to their stratigraphical relations and age. The controversy illustrates the fact that the 'conflict of science' is sometimes quite as much with itself as with outside bigotry. It began with Prof. Ebenezer Emmons's N. Y. geol. report 1842, in which he claimed that the rocks are older than Potsdam sandstone, and form a new system. They and their fossils were so imperfectly known, and the strata are so tilted, folded, and faulted, that his sweeping conclusion was not strange. He met with much and even scornful opposition; it is said that he was treated personally with indignity by reigning geologists, and that his last years (d. 1863) were much afflicted by it. He did good pioneer work, however; and his conclusions have been proved true in respect to a part of the series of rocks as antedating Potsdam sandstone, and now referred to lower Cambrian. There are in general three associated Taconic formations: quartzite, limestone, and the slates and schists. Prof. Emmons's system, afterward modified not very essentially by himself, was as follows (the oldest here placed at bottom, as should be the rule always in such tables), compared with the age as determined more recently—there being still some doubt as to how far the slates belong to the Hudson group or the Cambrian:

Prof. Emmons.	Recent Geologists.
Taconic slate.	Hudson and Cambrian.
Sparry limestone.	Lower Silurian.
Magnesian slate of Taconic Mts	Hudson slate.
Limestone.	Lower Silurian.
Granular quartz.	Cambrian.
Magnesian slate of Greylock.	Hudson slate.
Stockbridge limestone.	Lower Silurian.

He was right also as to the age of the 'black slate of Bald Mt.,' which, as well as his 'granular quartz' (quartzite), is found to have *Olenellus* and other fossils of the lower Primordial.

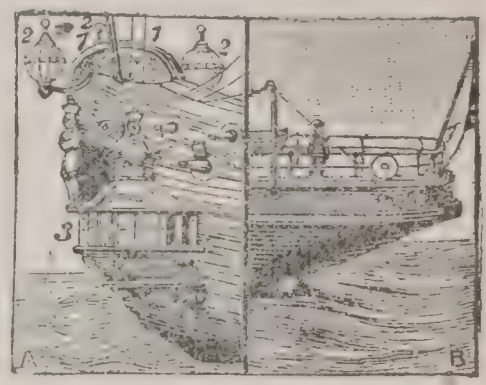
TACT, n. *tăkt* [F. *tact*, feeling, touch—from L. *tactus*, pp of *tangĕrĕ*, to touch]: peculiar skill or faculty; skill in adapting words or actions to circumstances; delicate handling; nice discernment. TACT'LESS, a. *-lĕs*, without tact.

TACTICS, n. plu. *tăk'tĭks* [Gr. *taktika*, military tactics; *taktikos*, fit for arranging—from *tassō*, I array: F. *tactique*]: evolutions and maneuvers in the position and arrangement of troops or of ships of war in the presence of an enemy; science and art of disposing military and naval forces for attack or defense (see TACTICS, MILITARY: TACTICS, NAVAL): way or method of proceeding or acting. TAC'TIC, a. *-tĭk*, or TAC'TICAL, a. *-tĭ-kăl*, of or relating to tactics. TAC'TICALLY, ad. *-lĭ*. TACTICIAN, n. *tăk-tĭsh'ăn*, one skilled in naval or military tactics; an adroit manager or contriver.

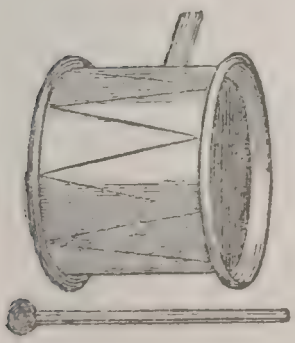
Sycamore (*Acer pseudoplatanus*)

Tacca pinnatifida.

Syngenesia.



Taffrail.



Tabor and **Tabor Stick.**

Syncarpium.

TACTICS, MILITARY: department of milit. science or art which concerns the evolutions of a force in the presence of the enemy: distinguished from Strategy (q v.), which is the art of maneuvering armies with reference to the objects of the whole campaign—the securing of communications, the cutting off an enemy from his base, throwing him into a position where he must fight at a disadvantage, or surrender, etc. It is the strategy of the immediate battle-field; the science of maneuvering and combining those military units which drill, discipline, and the regimental system have brought to the precision of machines. It was described by Napoleon as *the art of being the stronger*—that is, of bringing an overwhelming force to bear on any given point, whatever may be the relative strength of the entire armies opposed.

The earliest records of battles are those of mere single combats, in which the chiefs, fighting either on foot or in chariots, performed great deeds; and the commonalty, who apparently were without discipline, counted for little. With the growth of democracy arose the organization of the Phalanx (q.v.), whose advance was irresistible; and its firmness equally so if charged in front; but which changed front with great difficulty; was much deranged by broken ground; and failed entirely in a pursuit, or if attacked in flank. Far lighter, and more mobile, was the Roman Legion (q.v.). Among Roman tactics was also the admirable intrenchment, which they scarcely ever omitted as an additional source of strength for their position.

'Events reproduce themselves in cycles;' and with the decay of Roman civilization came again the mail-clad heroes and cavaliers—mounted this time on horses—who monopolized the honors of battle, while the undisciplined footmen had an undue share of the dangers. Later in the feudal period, this disparity between knight and footmen was diminished by the employment of bodies of archers, whose shafts carried distant death. The adoption of gunpowder for small-arms altogether neutralized the superiority of the armored knight, brought infantry into the front place in battle, and threw cavalry into the status of an auxiliary. The French revolutionary wars tended much to the development of artillery as a field-weapon, and Napoleon employed this terrible engine to its fullest extent, a practice followed by the best modern generals, who never risk a man where a cannon-ball can do the work. Frederick the Great was considered an innovator, for fighting with infantry four deep. During the French war, the formation of three deep became general, and still obtains in several European armies. Before the battle of Waterloo, the British leaders had acquired sufficient confidence in their troops to marshal them in a double line. It is in question whether the advance in arms of precision may not necessitate the formation in a single line, or even in a single line in open order.

The following indicate a few of the most important principles in this intricate science:

First, as to the art of being the stronger—undoubtedly

the highest recommendation in a general—we may cite the battle of Rivoli. In 1796 Napoleon was besieging Mantua with a small force, while a very much smaller army operated as an army of observation. The Austrian commander had collected at Trent a force powerful enough to crush completely the French army, and was marching south. Parallel with his course lay the lake of Garda, and to prevent Napoleon escaping up one side, as he marched down the other, the Austrian leader divided his army into two powerful corps, and marched one down each side of the lake. The instant the young French general knew of this division, he abandoned the seige of Mantua, collected every available man, and marched against one body of the enemy. Though far inferior on the whole, he was thus superior at the point of attack, and the victory of Rivoli decided virtually the whole campaign. This corresponded in principle with Napoleon's general tactics in battle. He formed his attack into column, tried to break through the centre of the enemy's line; and if he succeeded, then doubled back to one side, so as to concentrate the whole of his own force against one-half of the enemy's, which was usually routed before the other half of the line could come up to the rescue.

Taken collectively, the tactics of the three military arms may be thus summarized: The infantry form the line of battle, and probably decide the day by a general advance over the enemy's ground. The calvary seek to break the opposing infantry by frequent charges in front, or on any flank left exposed: if a part of the line wavers, a charge of horse should complete the disarray: when the rout begins, the cavalry should turn it by furious onslaught into utter discomfiture. The province of the artillery is to cannonade any portion of the line where men are massed, or where a charge is about to be made; to demoralize cavalry, and generally to carry destruction wherever it can best disconcert the enemy.

We advert to the tactics of the several arms individually.

Infantry.—This force has four formations—skirmishers, line, column, and square. The skirmishers precede and flank an advancing line or column, picking off the enemy, whose masses offer good mark, while their own extended order gives them comparative impunity. If resistance be encountered in force, the skirmishers retreat behind their massed supports. The line is a double or treble line of men, firing or charging. For musketry purposes, it is the most formidable formation, and is a favorite tactic where the officers can depend on the steadiness of their men. For bursting through a line, the deep column is the most effective. It was the favorite French formation during the revolutionary and Napoleonic wars, which only the British and the Russians succeeded in resisting. At Vimiera, the 50th Brit. regt., 700 strong, stood in line: it was attacked by a column of 2,000 French. The English col. threw back his left (the end attacked), and advancing his right, delivered a volley at point-blank range, charged the column in flank, and utterly routed it before the French

could deploy into line to resist the onslaught. The column is the best formation on a march; the line, in actual collision with the enemy. The formation in Echelon (q.v.) to a great extent combines these advantages. See SQUARE.

Cavalry.—The function of heavy cavalry is limited to the charge in line. The light cavalry form in small sections, to scour the country, collect supplies, and cut off stragglers.

Artillery.—No distinct tactics exist for this arm beyond the fact that a concentrated fire is vastly the most effective; and that the artillery should always have a support of infantry at hand, to protect it from a sudden incursion of hostile cavalry.

Tactics of position depend on the moral energy of the commander-in-chief. Few would dare, as Cæsar did, an invasion in which there was no retreat, if defeated. It is a military maxim not to fight with the rear on a river, unless many bridges be provided for retreat, in case of disaster. A convex front is better than a concave front, because internal communication is more easy. The flank should be protected by cavalry, or preferably by natural obstacles. In battle, a long march from one position to another, if the march exposes the flank to the enemy, is a fatal error: thus the French won Austerlitz, and lost Talavera. In a pursuit, a parallel line is better than the immediate route that the retreating enemy has taken, as supplies will be more readily procured, and he may by celerity be attacked in flank: this was strikingly exemplified in the Russian pursuit of Napoleon's army retreating from Moscow.

In the United States a new system of *Drill Regulations*, compiled by a special tactical board of army officers, superseded the *Tactics* of Casey and Upton 1892, Jan. 1, and made radical changes in the methods of handling troops.

TAC'TICS, NAVAL: science or art of the evolutions of war-ships in presence of an enemy. With the advent of steam, armored ships, and powerful rams, the tactics under which Rodney and Nelson conquered have passed away, while the principles of the new warfare have scarcely been sufficiently established for reduction to theory.

In ancient naval engagements, where the vessels fought on the comparatively smooth waters of the Mediterranean, and where the use of oars rendered the commanders nearly independent of the wind, the attack consisted of a charge with the beaked prows, followed, if that failed, by the use of balistæ and a hand-to-hand struggle: see NAVIES, ANCIENT. The introduction of gunpowder, with broadside ordnance, necessitated a change, and the great desideratum of each admiral was to present as long a line of broadsides as possible to the enemy, to take care that none of his ships was masked by intervention of another between it and the foe, and to endeavor in each ship to oppose its broadside to the bow or stern of a hostile ship, so as to obtain the preponderance of force, and to rake his decks. The ships of two or more decks formed the line of battle, while frigates and smaller vessels served as look-outs and skirmishers. A fleet in one line would, however, have been of inconven-

ient length for sailing: and it was usual to sail in three, six, or nine parallel lines while traversing the ocean, the ships of the rear lines tacking into their places in the line of battle on the signal to form for action. The great principle of maneuvering was to get the weather-gage, i. e., to be to windward of the enemy, both for facility of navigation and because the smoke would inconvenience him most. The standing attempt during the French war was to double the enemy's line (see CLERK, JOHN, of Eldin) by piercing it, or passing it at the van or rear, and then, by tacking in its rear, to place his ships between two fires: this was practiced first in Lord Rodney's action 1782, and was successfully repeated by Nelson at the battle of the Nile Under steam, and with ships carrying colossal ordnance, naval tactics have entirely changed. It was formerly the object to avoid being raked; it is now to avoid being hit at all, since the projectiles used are so tremendous that a few hits involve destruction. Ships are consequently constructed to offer the least mark to ordnance: and with the same view, they are kept constantly in rapid motion. Actions are fought, not, as in old time, within pistol-shot, but at a mile or two miles' distance. The loss of life is less; for the battle is no longer decided hand to hand by the cutlass and the boarding-pike, following a furious cannonade; but after a few long shots with ponderous missiles, one or other vessel becomes disabled, and being helpless, yields the victory to her foe. The ships are steamed end on when they act as rams, also thus to offer less mark to shot. —See *Examples and Maxims of Modern Naval Tactics*, by Commander W. Bainbridge-Hoff, U.S.N. (Portsmouth, 1885).

TACTILE, a. *tăk'tĭl* [F. *tactile*—from L. *tactilis*, that may be touched—from *tango*, I touch]: that may be touched or felt; tangible. TAC'TILELY, ad. *-lĭ*. TACTILITY, n. *tăk-tĭl'ĭ-tĭ*, the state of being tangible; tangibleness. TACTION, n. *tăk'shŭn*, the act of touching; touch. TAC'TUAL, a. *-tū-ăl*, pertaining to touch; derived from touch. TAC'TUALLY, ad. *-lĭ*.

TAD'MOR: see PALMYRA.

TADPOLE, n. *tăd'pōl* [compounded of *toad*, and *poll*, the head, which see]: a frog in its first state from the spawn (see FROG). TADPOLE-FISH, a teleostean fish resembling the animal from which it takes its name.

TAEL, *tāl* [Port. from Malay *tahil*, weight]: the term used by foreigners in China for the Chinese 'liang' or ounce (= 1⅓ oz. avoir.), the unit of monetary reckoning in China; a 'liang' or ounce of sycee or fine uncoined silver. The T. is not a coin but a weight. It is divided into *tenths* (called *mace*), and *hundredths* (called *candareens*). The 'Shanghai T.,' according to circular of the U. S. sec. of the treasury, was (1891, Jan. 1) worth $1.139 in U. S. gold coin, and the 'Haikwan (custom-house) T.' was worth $1.27. The latter T. is the standard T. of the Chinese custom authorities.

TA'EN, v. *tān:* a poetical contraction for *taken*.

TÆNIA, n. *tē'nĭ-ă* [L. *tænĭa;* Gr. *tainĭa*, a ribbon]: intestinal worm, usually called the *Tapeworm* (q.v.): in *arch.*, the fillet or band above the architrave of the Doric order. TÆ'NIOID, a. *-oyd* [Gr. *eidos*, resemblance]: shaped like a ribbon, as the Tapeworm (q.v.). TÆNICIDE, *tē'nĭ-sid* [L. *cædere*, to kill]: drug designed to kill tapeworms.

TAE-PINGS, or TAI-PINGS, *tī-pĭngz':* Chinese rebels who began a warfare 1850 which desolated some of the best cultivated provinces. (For the strange fanaticism which characterized this rebellion, see CHINESE EMPIRE—*History.*) After the war of 1860, it became the interest of the English, French, and American governments to re-establish order in China. The repulse of the rebels at Shanghai 1860 Aug., had been followed by several engagements between them and the imperialists, in which the T. were defeated, mainly in consequence of the re-organization of the imperial army by Frederick T. Ward (q.v.), an American. In the beginning of 1862, the T. again advanced on Shanghai, and were twice defeated. In that year Ward was killed; and 'Ward's force,' transferred to an English officer, Charles G. Gordon (q.v.), took the name Gordon's brigade, and rendered essential service to the imperial govt. The rebels were defeated in more than 16 engagements; and in 1864 almost every important city was taken from them. The conduct of the imperial authorities at Su-chow, in permitting a horrible massacre, led to withdrawal of the English military force; but the rebellion had been effectually checked. The Tae-pings were finally dispersed, 1865, April, when they were routed by the imperial army at Kia-ying-chou in Kwan-tung. In the same year, the Nienfei, or marauders of the north, began to be troublesome. This was a marauding expedition, without political significance, organized by restless spirits among farmers who had been ruined by the overflowing of the Yellow river, the repair of whose embankments had been neglected on account of the confusion and expense of the Tae-ping rebellion. The last show of active warfare made by a body of Nienfei was in the beginning of 1866, when, joined by some imperialist regiments whose pay was in arrears, they threatened Hankow; and would have attacked the European Settlement but for the arrival of English gun-boats. The malcontent imperialists were brought back to allegiance.

The Mohammedans of n.w. China have often given trouble, and are apt to be confounded with the Tae-pings: see PANTHAYS.

TAFFEREL, n. *tăf'fĕr-ĕl*, or TAFFRAIL, n. *tăf'rāl* [Dut. *tafereel*, a panel—from *tafel*, a table—from L. *tabŭla*, a table]: in a *ship*, the uppermost part of the stern: (usually as *Taffrail*) the rail over the heads of the stern-timbers, extending across the stern from one quarter-stanchion to another.

TAFFETA, n. *tăf'fĕ-tă*, or TAF'FETY, n. *-tĭ* [F. *taffetas;* It. *taffetta*, taffeta—from Pers. *taftah*—from *taftan*, to twist, to spin]: thin, glossy, silken fabric, having a wavy lustre, much used for curtains and hangings: in *med.*, a plaster spread on thin silk. The term T. has had a very various application at different periods; and has now become a sort of generic term for *Plain Silk*, Gros de Naples, Gros des Indes, Shot or Chameleon Silk, Glacé, and many others; and even for some combinations of silk, wool, and other materials. TAFFETA PHRASES, smooth, sleek, honeyed phrases; euphemisms.

TAFFRAIL: see TAFFEREL.

TAFFY, n. *tăf'fĭ:* meaning 'David,' the familiar name for a Welshman.

TAFFY: candy made of molasses or sugar, boiled down, and cooled in shallow pans; in *slang*, flattery. In England the candy is called *Toffy*.

TAFIA, n. *tăf'ĭ-ă* [F.]: in French sugar-producing colonies, a kind of rum distilled from molasses.

TAFILELT, *tä-fĭ-lĕlt'*, or TAFILET, *-lĕt':* one of the four territorial divisions of Morocco (q.v.).

TAFT, ALPHONSO, LL.D.: 1810, Nov. 5—1891, May 21; b. Townshend, Vt.: jurist. He graduated at Yale College 1833, was tutor there 1835–37, was admitted to the bar 1838, and settled in Cincinnati to practice 1840. In 1856 he was defeated as republican candidate for congress; 1866–72 was judge of the supreme court of O.; 1876, Mar. 8—May 22, sec. of war; 1876–7 U. S. atty.gen.; 1882–84 U. S. minister to Austria; and 1884–5 U. S. minister to Russia. He received his degree from Yale 1867, was a member of its corporation 1872–82, and was for many years a trustee of the Univ. of Cincinnati.

TAG, n. *tăg* [Sw. *tagg;* Low Ger. *takk;* Ger. *zacke*, a point, a thorn (see also TACK)]: a metallic point at the end of a string or lace; the end or extremity; anything paltry and mean; a sheep of the first year: V. to fit with a point, as a lace; to fit one thing to another, with *on*. TAG'GING, imp.: N. materials for tags. TAGGED, pp. *tăgd*. TAG-SORE, a disease in sheep. TAG-TAIL, a worm having its tail different in color from the body. TAG'-RAG, n. *-răg*, the rabble. TAG, RAG AND BOBTAIL, the rabble; the dregs of the people.

TAGANROG, *tä-gän-rŏg':* important seaport of s. Russia, govt. of Ekaterinoslav, on the n. shore of the Sea of Azov, 20 m. n.w. of the chief mouth of the Don. It was founded by Peter the Great 1696, was lost to Russia 1712–74, when it again reverted to the people who founded it, and since that time it has increased in importance yearly. The port of T. is so shallow that ships cannot approach within half a mile of the quay, and at this distance from shore they load and unload by the help of barges: large ships have to lie several miles from the town. The harbor is wholly unprotected. Owing to its position on the shore of a very fertile country, T. is able to export wheat in large quantities, as well as linseed, hempseed, skins, wool, but-

ter, iron, copper, and Russian leather: of these articles, the last four are obtained from the governments of Perm and Orenburg. The foreign trade has become large. Imports are mainly wine, oil, coffee, machinery and agricultural implements, tea, fruits, and porter. Exports much exceed imports. There are two fairs yearly, and fishery is diligently prosecuted. T. has a remarkably fine climate. There are many handsome public buildings.—Pop. (1870) 38,000; (1888) 56,047; (1897) 51,965.

TAGLIA, n. *tăl'yá* [It. *taglia*, a pulley]: in *mech.*, the name given to a system of pulleys, one set being in a fixed block, and another in a movable block to which the weight is attached.

TAGLIONI, *tăl-yō'nē*, MARIE: famous *danseuse*: 1809, Apr. 23—1884, Apr.; b. Stockholm; of Italian parents, her father (Filippo T.) having been ballet-master at several opera-houses in different parts of the continent. Mademoiselle T. made her *début*, Paris, 1827, where she excited a *furor*, and was at once recognized as the first of ballet-dancers. Her success was equally great in London and other European capitals. She married a count 1832, retired from the stage 1847 with a fortune (afterward lost during the Franco-German war), and taught dancing in London and elsewhere. She died at Marseilles.—She was not remarkable for personal beauty; but her style of dancing was new, with an exquisite ideal grace (e.g., in *La Sylphide*), rather than that of the usual ballet.

TAGUS, *tā'gŭs* (Sp. *Tajo*): largest river of the Spanish Peninsula. It rises on the frontier of New Castile and Aragon, 5,225 ft. above sea-level; flows n.w. about 30 m. to its union with the Gallo, where it curves s.w. to Toledo, thence w. to Abrantes in Portugal. From Abrantes, its course is s.w., passing Lisbon, about 10 m. below which city it enters the Atlantic. At Peralejos, a few miles from its source, it is 12 inches deep, 15 paces broad, and confined between rocky walls 400 ft. high. At the city of Toledo, it breaks through a romantic rocky pass whose walls are more than 200 ft. high. From Villavelha, 18 m. within the Portuguese border, the T. is navigable to its mouth, 115 m.: for large vessels, navigation begins at Santarem, to which point the tide reaches. Above Lisbon, the river widens like an estuary, in some places 5 m. broad; opposite Lisbon, however, it is only one mile broad. The principal affluents are the Jarama, Guadarrama, Alberche, Alagon, and Zezere from the n., and the Guadiela and Rio del Monte from the s. Total length 566 m., of which 192 m. are in Portugal or on its boundary.

TAHITI, *tâ-hē'tē*, or OTAHEITE, *ō-tâ-hē'tēr* chief of the Society Islands (q.v.), 35 m. long, about 120 m. in circumference (600 sq. m.); and consists of two peninsulas, connected by a short, low isthmus less than a mile in width and sometimes submerged. The whole island is mountainous and picturesque: two mountains rise above 7,000 ft. About one-eighth of the people are Europeans. The natives have largely accepted the Prot. faith. The chief,

town is Papiete (with 4,282 inhabitants, of whom 2,490 are French), with a beautiful harbor. In 1880 T. was annexed by France, with the other Society Islands. Pop. (1897) 10,300. For govt., trade, etc., of T., see SOCIETY ISLANDS.

TAHLEQUAH, *tâ'lē-kwâ*: a town, cap. of the Cherokee nation, Ind. Terr.; 1 m. from the Illinois river, 15 m. from the Missouri Pacific railroad, 45 m. n.w. of Fort Smith, Ark. It is surrounded by prairie-land on which large herds of cattle are raised; contains the national capitol, male seminary, female seminary, insane and blind asylum, several public schools, national penitentiary, and Bapt., Congl., Meth. Episc., Moravian, and Presb. meeting-houses; and has 2 weekly newspapers. Pop. (1900) 1,482.

TAHOE, *tâ-hō'*, LAKE: picturesque body of water intersected by the boundary-line between Cal. and Nev.; 3,000 ft. above sea-level; greatest length 21 m., greatest width 12 m.; estimated area 195 sq. m. It receives water from probably more than 100 streams of various sizes, the principal being the Upper Truckee river; and discharges solely through the Truckee river on the n.w. shore, whence the water passes through a mountain gorge, then n.e. through the plains of Nev., and into Pyramid Lake. In summer the climate is delightful, and the charm of the landscape is intensified by the beautiful hues and the remarkable transparency of the water; in winter the climate is of prolonged severity.

TAIKŌ-SAMA, *tī'kō-sâ'mâ* ('My lord the Taikō [or ex-premier].' title by which Toyotomi Hideyoshi, *tō-yō-tō'mē hē-dā-yōsh'ī*, is generally known in Japanese history): Japanese warrior and statesman: 1538–98; b. in the province of Owari; son of a peasant. When a boy, he entered the service of Nobunaga as a groom, but distinguished himself as a soldier, and was soon advanced to important commands. In 1575 he was made Chikuzen no kami (lord of Chikuzen); 1586 became Kuambaku or premier (an office hereditary in the princely family of Fujiwara); 1591 resigned in favor of his adopted son, but still wielding the power, and assumed the usual title of ex premier, Taikō or 'great noble.' He subdued the warring clans, expelled the Jesuit missionaries, crucifying many Christians, and prohibited Christianity—deeming the Jesuit influence subversive of the power of the mikado. In 1594 he undertook a needless invasion of Corea (but not in person), which, though at first successful, resulted in no permanent advantage; and on his death the army withdrew.

TAIL, n. *tāl* [Icel. *tagl*, a horse-tail: Sw. *tagel*, horse-hair: Goth. *tagl*, hair]: the part which terminates an animal's body; the hinder part of anything; a shoot or projection hanging loosely from the hinder part; the luminous train following the body of a comet; the bottom or lower part of anything; anything long and pendent; the end or spent part, as of a storm; the reverse of a coin: V. to pull by the tail; in *arch.*, to fasten by one of its ends into a wall,

with *in*. TAIL'ING, imp.: N. in *arch.*, the part of a projecting stone or brick inserted in a wall. TAILED, pp. *tāld:* ADJ. having a tail. TAILINGS, n. plu. *tāl'ingz*, the lighter parts of grain in winnowing. TAIL'LESS, a. *-lĕs*, having no tail. TAIL-BLOCK, in *ships*, a single block having a short piece of rope attached to it, by which it may be fastened to any other thing. TAIL-BOARD, the movable board at the back of a cart or wagon for convenience in unloading. TAIL-DRAIN, in *field-draining*, a main drain which receives the water running out of the other drains. TAILPIECE, a piece at the end; the end-piece of a violin to which the strings are attached; in *printing*, an ornamental design placed at the end of a chapter or division of a book. TAIL-RACE, the stream of water from a mill after it has turned the wheel. TO TURN TAIL, to run away.

TAIL, or TAILLE, n. *tāl* [F. *taille*, a cutting: It. *taglia*, a share, a portion (see TAILOR)]: limitation; abridgment. TAILAGE, n. *tāl ăj*, *literally*, a piece cut out of the whole—hence, a toll or tax. AN ESTATE TAIL, in *Eng. law*, partial estate cut or carved out of the fee-simple; an estate limited to a person and the heirs of his body, or to a person and the heirs-male of his body, or to some other class of heirs less extensive than the heirs at law: see ENTAIL.

TAILOR, n. *tāl'ĕr* [F. *tailleur*, a tailor—from *tailler;* It. *tagliare*, to cut—from mid. L. *talĕārĕ*, to cut a shoot—from L. *talĕa*, a cutting, a stick]: one whose business it is to make men's outer garments: V. to work as a tailor. TAIL'ORING, imp.: N. the business of a tailor. TAIL'ORED, pp. *-ĕrd*. TAIL'ORESS, n. *-ĕs*, a female who makes men's garments.

TAILOR-BIRD (*Orthotomus*): genus of birds of family *Sylviidæ* (q.v.), with long graduated tail whose feathers are narrow. The species are numerous, natives of the E. Indies and of the Indian Archipelago, and frequent cultivated grounds, where they are seen usually in pairs. Their flight is rapid and undulating, and they seldom ascend above the lower branches of trees. The name is derived from mode of forming the nest: two leaves are taken at the extremity of a twig, and are sewed together by their edges, or a large leaf is bent and sewed together; the necessary holes being made by the bill, and vegetable fibres forming the thread. Within the hollow thus made, a cottony substance is placed to receive the eggs.

TAILZIE, n. *tāl'yĭ*, or TAIL'YIE, n. *-yĭ* [F. *tailler*, to cut (see TAILOR)]: in *Scots law*, ancient term corresponding with the Eng. *Entail* (q.v.): any deed by which the legal course of inheritance is cut off and an arbitrary one substituted: V. to entail.

TAIN, *tān:* royal, parliamentary, and municipal burgh in the county of Ross and Cromarty, Scotland; on the s. shore of the Dornoch Firth, 24 m. n.n.e. of Inverness. There is no proper harbor. The most interesting building is a small ruined chapel, remarkably rude and simple in architecture, and said to date from the 13th c.: there is also a collegiate church, founded 1471. Pop. of royal burgh (1881) 2,221; (1891) 1,636.

TAINE, *tān,* HIPPOLYTE ADOLPHE: distinguished French critic:1828 Apr. 21—1893 Mar. 5: b. Vouziers. He studied at Paris, where 1853 he obtained the diploma of *docteur ès lettres*, for two essays, *De Personis Platonicis* and *Essai sur les Fables de Lafontaine.* They were followed by his *Essai sur Tite Live* (1854), crowned by the French Acad.; *Les Philosophes Français du dix-neuvième Siècle* (Paris 1856); *Essais de Critique et d'Histoire* (Paris 1857); *Histoire de la Littérature Anglaise* (Paris 1864); *Philosophie de l'Art* (1865; Eng. transl.); *Notes sur l'Angleterre* (1871; Eng. transl.); and others. In *Littérature Anglaise* (Eng. transl., Edinburgh 1872), the author surveys and criticises the whole Eng. literature from a point of view which is conceived to be rigorously scientific. According to T., there are three things to be borne in mind when writing the history of a nation's literature: first, the *race* to which the nation belongs; second, its *position* both geographical and in civilization in the different phases of its literary development; third, the *period* or duration of these. Under this view, the history of literature assumes the character of a psychological problem. Among T.'s recent works is *Les Origines de la France Contemporaine,* of which vol. I., *L'Ancien Régime,* appeared 1875; II., *La Revolution,* 1878; III., *La Conquête Jacobine,* 1881; IV., *Le Gouvernement Revolutionnaire,* 1885. Vol. I. of *The Modern Régime* appeared 1890. T. became a member of the Acad. 1878.—T. is esteemed widely as an exceedingly instructive writer, one of the most brilliant of our times; but has been more or less under ban in his own country, as well as elsewhere, in regard to some of his materialistic and atheistic tendencies. The *Essai sur Tite Live* defended the system of Spinoza, and his *Les Philosophes Français* was anti-spiritual.

TAINT, n. *tānt* [F. *teint,* a stain—from F. *teindre;* L. *tingĕrĕ,* to tinge, to color]: a touch of corruption; a stain, a tincture; a blemish; infection; corruption: V. to defile; to contaminate; to impregnate with anything corrupt or foul; to sully; to be slightly infected or corrupted. TAINT'ING, imp. TAINT'ED, pp. TAINT'LESS, a. *-lĕs,* pure; free from infection. TAINT'LESSLY, ad. *-lĭ.* TAINT'URE, n. *-ūr,* tinge; defilement. TAINTWORM, in *OE.,* a certain kind of worm which taints or corrupts living or dead bodies.—SYN. of 'taint, v.': to stain; sully; infect; poison; disease; corrupt; tincture; deprave; spot; soil; blemish; pollute; vitiate.

TAIT, *tāt*, ARCHIBALD CAMPBELL, D.D., LL.D.: 1811, Dec. 22—1882, Dec. 3; b. Edinburgh: Anglican archbishop. He was educated at the Edinburgh Acad., Glasgow Univ., and Balliol College, Oxford; became a fellow, tutor, dean, and select preacher at the college; opposed the Tractarian movement 1841; was head-master at Rugby 1842–50; then became dean of Carlisle; and succeeded Dr. Blomfield as bp. of London 1856, Aug. In 10 years he raised $5,000,000 for erection of churches, schools, and parsonages in the suburbs of London. In 1868 he was appointed abp. of Canterbury, and primate of all England, succeeding Dr. Longley.

TAI-WAN-FOO, *tī-wân-fō'*: city, cap. of the island of Taiwan, known to foreigners as Formosa (q.v.); on a large plain 3 m. from the s.w. coast. It is a large straggling town, contains many park-like spaces with fine trees and green lanes, and is surrounded by a high battlemented wall 6 m. in extent. Its chief edifices are the residences of the mandarins, and the temples. The harbor of T., at Amping, is only a shallow open roadstead; trade is carried on only in five months of the year, cargo having to be carried in native boats. The chief export is sugar, which is grown all over the plain of Formosa; also rattan canes. About 27 m. s. is the harbor of Takao, headquarters of the customs staff; it is better than that of Amping.—Pop. of T.-W.-F., 120,000.—See 'Description of Formosa' in *Geographical Magazine*, 1877.

TAI-YUAN, *tī-yō-ân'*: city of China, province of Shansi, on the Fuen-ho, affluent of the Hoang-ho; 250 m. s.w. of Pekin. It is said to be about 10 m. in circumference, fortified and populous. Porcelain, iron-wares, and carpets are manufactured.

TAJ-MAHAL': see AGRA, city.

TAKE, v. *tāk* [Icel. *tak*, grip, hold; *taka*, to seize: Sw. *tag*, hold: Dut. *tacken*, to touch: L. *tactus*, touched; *tangĕrĕ*, to touch]: to obtain in almost any manner; to receive in any temper or disposition of mind; to suppose; to receive in thought; to lay hold of; to seize; to make prisoner; to entrap; to swallow; to understand in a particular sense or manner; to use, as an oath or expression; to captivate with pleasure; to engage; to use or employ; to procure; to turn to; to choose; to get into, as to *take* the water; to have recourse to, as to *take* to a tree; to pursue or follow, as a course; to perform; to leap or jump over; to copy or paint, as a likeness; to change with respect of place, as he *took* out his hand; to hire or rent, as a house; to enter upon, as a campaign; to conquer, as a fortress; to close in with; to comply with; to separate for one's self from any quantity; to please; to fasten on; to gain reception; to have a tendency to; to catch; to be fixed; in *OE.*, to blast; to infect; admit; to receive payments: N. a catch, as of fish at one haul or catch; in *printing*, a quantity of copy given to a compositor. TA'KING, imp.: ADJ. alluring; attracting: N. the act of receiving or gaining possession; capture; in *OE.*, distress of mind. TOOK, pt. *tŭk*, did take. TAKEN, pp.

tā'kn. TA'KER, n. *-kĕr*, one who takes. TA'KINGNESS, n. the quality of pleasing. TO TAKE ADVANTAGE OF, to catch by surprise; to make use of convenient circumstances to the prejudice of. TO TAKE AFTER, to imitate; to be like. TO TAKE AIM, to direct the eye or weapon. TO TAKE ALONG, to carry, lead, or convey. TO TAKE ARMS, to commence war or hostilities. TO TAKE AWAY, to remove; to deprive of. TO TAKE BREATH, to cease or stop, as from labor, in order to breathe or rest. TO TAKE CARE OF, to have the charge or care of; to superintend. TO TAKE DOWN, to remove from a high position; to reduce; to pull down; to snub; to reduce to writing. TO TAKE EFFECT, to be efficacious; to come into operation. TO TAKE FIRE, to become ignited. TO TAKE FOR, to suppose to be some other person or thing. TO TAKE FROM, to deprive of; to deduct; to detract. TO TAKE HEART, to gain confidence or courage; to be encouraged. TO TAKE HEED, to be careful or cautious. TO TAKE HEED TO, to attend to with care. TO TAKE HOLD OF, to seize. TO TAKE HORSE, to mount and ride a horse. TO TAKE IN, to inclose; to comprise; to contract; to furl; to cheat; to admit; to receive mentally; to receive regularly, as a periodical. TO TAKE IN HAND, to undertake. TO TAKE LEAVE, to bid adieu or farewell. TO TAKE NOTICE, to show signs of mental growth, as an infant; to observe with particular attention; to make remarks. TO TAKE OFF, to remove; to cut off; to destroy; to swallow; to imitate or mimic; to purchase; to copy. TO TAKE ON, to assume; to take upon one's self; to be violently affected; in *OE.*, to claim a character; to grieve; to pine. TO TAKE OUT, to remove from within; to extract. TO TAKE PART, to share. TO TAKE PART WITH, to unite with; to join with. TO TAKE PLACE, to happen. TO TAKE ROOT, to live and grow, as a plant. TO TAKE STOCK: see STOCK-TAKING, under STOCK 2. TO TAKE TO, to be fond of; to become attached to; to resort to. TO TAKE UP, to lift; to commence; to purchase or borrow; to engage the attention; to seize or arrest; to begin where another has left off; to occupy; to assume or carry on; to pay and receive, as a bill of exchange. TO TAKE UP WITH, to become familiar with; to lodge or dwell with; in *OE.*, to be content with. TO TAKE UP ARMS, to begin war. TO TAKE THE AIR, to walk or ride in the open air for exercise and health. TO TAKE THE FIELD, to enter upon a campaign; to begin open war. TO TAKE TO HEART, to feel sensibly or keenly. TO TAKE UPON, to assume; to undertake. TO TAKE WITH, to please.—SYN. of 'take, v.': to receive; seize; catch; snatch; charm; engage; entrap; exact; get; have; appropriate; use; employ; adopt; procure; practice; form; fix; admit; suffer; follow; pursue; swallow; convey; carry; transport; accept; separate; allow; admit; endure; bear; draw; derive; leap; assume; suppose; withdraw; comprise; comprehend; produce; hire; rent; incur; please.

TALAPOIN, n. *tăl'ă-poyn*, or TELAPOIN, n. *tĕl'ă-poyn:* a priest of Burmah or Siam; also a kind of monkey.

TALARIA, n. plu. *ta-lā'rĭ-a* [L.—from *talus*, an ankle]: in *class. antiq.*, the small wings attached to the ankles of Hermes or Mercury in representations of that deity.

TALAVERA DE LA REINA, *tâ-lâ-vā'râ dā lâ rā'ē-nâ:* town of Spain, in New Castile, in the modern province of Toledo; charmingly situated on the Tagus, 75 m. s.w. of Madrid. It is ancient, straggling, dirty, and inconvenient; is surrounded by remains of interesting old walls, and abounds in antique fragments. It was formerly a flourishing town; but of its manufactures only that of silk is now carried on. Fruits are extensively produced in the vicinity. Here, 1809, July 27.28, Sir Arthur Wellesley, with 19,000 English and German troops, and about 34,000 Spaniards, who, however, were scarcely at all engaged, defeated more than 50,000 veteran French troops, under Joseph Bonaparte and Marshals Jourdan and Victor.—Pop. (1887) 10,497.

TALBOT, n. *tawl'bŏt* [said to be after the *Talbot* family, whose arms contain the figure of a dog]: hunting-dog, of pure white color, with very broad muzzle, deep chops, and long pendulous ears. The name was originally probably equivalent to Blood-hound (q.v.), but afterward applied to a race of hounds, now extinct or nearly so, which seem to have been kept for show rather than for use.

TALBOT, *tawl'bot*, JOHN: non-juring Anglican bishop: 1645–1727, Nov. 29; b. Wymondham, England. He was educated at Cambridge, and became rector at Freetherne. As ship-chaplain 1702, he became acquainted with missionaries sent out from England; and offered himself and was appointed to like service, for 20 yrs. officiating with faithful effort in St. Mary's Chh., Burlington, N. J. Failing to procure the appointment of a bishop from the mother country, and deeming the need very great, he went to England, and was consecrated secretly by non-juring bishops. Two years after his return in 1722, his claim was made known, and he was by order of govt. prohibited from officiating, he himself being a non-juror (see NON-JUROR). In 1875 his episcopal seal was found, and a large copy in brass affixed to a tablet in St. Mary's Church, Burlington, N. J.

TAL'BOT, SILAS: brilliant naval captain in the revolution: 1751–1813, June 30; b. Dighton, Mass. With commission of capt. from the state of R. I., he was among the first in the war. After the transfer of operations from Boston to New York, he conceived and carried out the plan of sending a fire-ship from Ft. Washington against the enemy's fleet; this, though not very successful, brought him the thanks of congress and promotion to major. He had part in operations near Philadelphia, but his noted achievements were the taking of the schooner *Pigot*, eight guns, near Newport, his vessel being a small sloop; with this and a sloop he captured two other armed schooners and two privateers; also the brig *King George*, 12 guns, after a severe battle and boarding the brig; also the brig *Elliot* and the ship *Dragon*, in which last fight his speaking-trumpet and coat were pierced with shot. While becalmed, his own ship was taken; he was confined in the Jersey

prison-ship, and sent to England in the hold of the *Yarmouth* in winter; but was exchanged 1781. After serving as state representative 1793–4, he was in command of the frigate *Constitution* and of a fleet in the W. Indies 1798, during the French hostilities. He received the thanks of congress repeatedly, and his last promotion was to captaincy in the navy. The scars of many wounds attested his bravery; and he carried five bullets, it is said, in his body. He died in New York, and was buried in Trinity churchyard.

TAL'BOT, WILLIAM HENRY FOX: known for inventions in photography: 1800, Feb.—1877, Sep. 17; only child of William D. T. of Locock Abbey, Wilts, England. He was educated at Harrow, and at Trinity College, Cambridge, where he obtained the junior chancellor's medal 1821. He was for a time in parliament, but turned from politics to chemical and optical science, busying himself with the problem of fixing shadows, unaware of what had been effected in this department by Wedgwood and Davy. He discovered for himself a method of obtaining and fixing sun-pictures; and on the public announcement of Daguerre's successes in the same field, secured his own rights by publishing a paper (*Phil. Mag.*, 1839, March) detailing the steps of his investigation and their result: see PHOTOGRAPHY. This process, by which a *Negative* (q.v.) was primarily obtained, was subsequently improved by his invention (patented 1841) of the Calotype (q.v.) process. Soon afterward he obtained fresh patents, for an 'instantaneous process,' a mode of 'photographic engraving,' and a 'polyglyptic process.' A later invention of his, patented 1858, was called by him Photoglyphic Engraving. In 1842 T. obtained the medal of the Royal Soc. for his discoveries. Latterly he applied himself to the study of general physics and to philological researches. Among his works are: *Hermes, or Classical and Antiquarian Researches; Legendary Tales; Illustrations of the Antiquity of the Book of Genesis;* and a work on *English Etymologies.*

TALBOTYPE, *tawl'bō-tīp:* photographic process, called by the inventor, William H. Fox Talbot (q.v.), the Calotype (q.v.) process. Its essential features consist in the production in the camera of an image by light *on* the *surface* of chemically prepared paper; and this distinguishes it from other *paper* processes, and by consequence from other photographic processes.

TALC, n. *tălk* [Ger. *talk;* Sp. *talco;* F. *talc*, talc—from Arab. *talq*, talc, mica]: a mineral, magnesian silicate, $4SiO_2.3MgO.H_2O$. It is an orthorhombic mineral occurring in short hexagonal prisms and plates, also in globular and stellate groups. It is of different colors, but commonly either white, green, or yellow. The foliated variety is translucent. The different varieties of T. are classified as follows by Prof. Dana: (1) Foliated; (2) Massive (Steatite [q.v.] or soapstone). The Massive variety he further subdivides into (*a*) Coarse Granular (potstone, etc.), (*b*) Cryptocrystalline (French chalk), (*c*) Rensselaerite, and (*d*) Indurated. Another variety of T., fibrous T., sometimes called *Agalite*, is quarried at Gouverneur, N. Y. This, being ground fine, is used in manufacture of paper, as a 'filler' and to give a glossy surface. When reduced to the desired degree of fineness, fibrous T. is known as 'mineral pulp' or 'asbestine pulp.' The production of fibrous T. at Gouverneur 1901 was 69,200 tons, valued at $483,600. TALCKY, or TALCY, a. *tălk'ĭ*, or TALCOSE, a. *tălk'ōs*, consisting of talc, or containing it. TALCITE, n. *tăl'sīt*, a mineral consisting of minute grains or scales of a silver-white or greenish color, with a glimmering pearly lustre—also called *nacrite*. TALCOSE GRANITE, a granite rock composed of felspar, quartz, and talc or chlorite. TALC-SCHIST, a glistening rock consisting of talc and quartz arranged in foliæ, more or less crumpled, of various colors, but more frequently of a greenish hue.

TALCOTT, *tawl'kot*, JOHN: one of the first settlers and magistrates of Hartford, Conn.: 1600–60; b. Braintree, England. He came to Boston 1632, two years after its settlement, in company with the Rev. Thomas Hooker; and with him and others founded the Hartford colony 1636. From that time until his death, he was its chief magistrate. His house was the first erected in that colony. —JOHN T., his son, 1630–88, b. in England, accompanied his father; was asst. magistrate while the colony was separate, also deputy and treasurer; and was one of the patentees in the royal charter of Conn. 1662. He was a military officer of the colony; and he led an expedition against Indians, rescuing Hadley, Mass., from an attack, and making an effective campaign; he also fought the Narragansetts with success. He was called the Indian fighter, and was appointed lieut.col. He died in Hartford.

TAL'COTT, MARY H. (OTIS): about 1820–88, Apr. 17; b. Watertown, N. Y.: philanthropist. She married Mancel T. (1817–78) 1841, Oct. 25; assisted him in his large charitable work, and carried it on after his death, distributing about $300,000 in charity and in aid of the Universalist denomination, establishing day nurseries for poor children, and bequeathing the most of her estate to religious, educational, and charitable uses.

TAL'COTT, SAMUEL: early settler in Conn.: 1634–91, Nov. 10; b. Cambridge, Mass.; son of John T. (colonist, 1600–60). He graduated at Harvard 1658; settled in Wethersfield, Conn.; was deputy to the general court for many years; capt. of the troop of Hartford co.; and one of the founders of Glastonbury. He died in Wethersfield.

TALE, n. *tāl* [Dan. *tale;* Icel. *tala*, a speech: AS. *talu*, a number, narrative: Ger. *zahl*, number]: a story; a short narrative of adventure; a fiction; number told or reckoned; a numeral account; information; disclosure: V. to tell off in numbers. TAL'ING, imp. TALED, pp. *tāld.* TALE-BEARER, one who impertinently or officiously gives intelligence about the doings of others that may create mischief and ill-will. TALE-BEARING, officious or thoughtless information given about others that may create ill-will: ADJ. giving officious information. TALE-TELLER, one who relates stories, generally for amusement.—SYN. of 'tale, n.': account; narrative; narration; description; record; relation; memoir; history; anecdote; fable; incident; legend; reckoning.

TALE, n. *tāl:* another spelling of TAEL, which see.

TALED, n. *tā'lĕd* [Heb. *talith*]: in *Jewish antiq.*, a garment of fine linen with a fringe attached to it, worn by the Jews in Talmudic times: it was ample in size, to admit of the head being enveloped in it while its wearer engaged in prayer.

TALEGALLA, *tăl-ē-găl'la:* genus of Gallinaceous birds, of family *Megapodidæ;* having a strong, thick, and very short bill, upper mandible curved and pointed; head and neck almost quite naked; wings short and round; tail rather long, rounded on the sides; legs strong, feathered a little below the joint of the tibia and tarsus; tarsi covered with scales in front; toes long and strong; claws large and sharp. The species are natives of Australia and New Guinea. The best known is the BRUSH TURKEY (*T. Lathami*) of Australia, known also as WATTLED T. and NEW HOLLAND VULTURE, about the size of a turkey, with blackish-brown plumage. It inhabits thickly wooded parts of New South Wales; it is shy, and when pursued endeavors to escape by running through the thickest *brush*, or by leaping to the lowest branches of a tree, from which it ascends branch by branch. It is easy game to the sportsman; and though several of a flock are shot, the rest keep their place undisturbed. Small flocks make their nests together, the males heaping up with their feet mounds of several cart-loads of earth and decayed leaves, which are used from year to year, new materials being added. The eggs are hatched by the heat of the sun and of the fermenting mound, each egg being separately buried: the parent birds partially uncover them during the day. Nearly a bushel of eggs are sometimes found in a heap. The male bird gives great attention to the young after they are hatched, covering them up partially in the mound at night for warmth. The flesh of the T. is excellent; the eggs are also very delicate. It is thought that this bird might easily be added to the list of domestic poultry in Europe and America.

Tailor Bird and Nest.

Talegalla.

TALEN'T, n. *tăl'ĕnt* [F. *talent*, a talent weight, ability—from L. *talen'tum;* Gr. *talan'ton*, a thing weighed]: among the *ancients*, a weight, or a sum of money, varying in amount—the Jewish, of silver, about $1,900; of gold (one-sixth less in weight), about $22,000: in metaphorical use, as in the Scripture parable of the talents (Matt. xxv.), natural gift, or endowment; eminent ability; particular faculty. TAL'ENTED, a. possessing skill or talents; mentally gifted. —SYN. of 'talent': genius; skill; ability; capacity; capability; cleverness; faculty; gift; endowment.

Talent was a word used by Homer to denote both a balance, and a weight of some monetary currency; and was probably only a shekel, or $\frac{1}{3000}$ or $\frac{1}{3600}$ of the Assyrian T., which weighed about 65 lbs. 5 oz. avoirdupois and was divided into 60 minas, and each mina into 60 shekels. The T., though called by a Greek name, was undoubtedly of Assyrian origin and was introduced into Greece by Phœnician merchants. It never was a coin. The first Hellenic T. was the old Æginetan (88 lbs. 12 oz. avoirdupois); this was followed by the Eubœan (or Later Æginetan), equal to 80 lbs. 4 oz. The standard T. of Solon, which later came into general use throughout the Hellenic world as the Attic T., was equal to 56 lbs. 14 oz.; as a denomination of silver money, the Attic T. was equal to about $1,000. The 'great T.' of the Romans is computed to have represented a value (in our money) of about $480; and the Roman 'little T.' a value of about $363: their weights are not known.

TALES, n. plu. *tā'lēz* [plu. of L. *tālĭs*, such]: in *law*, at a trial, qualified men who happen to be present, taken, by permission of the judge, to make up the insufficiency in the number of the jurors, occasioned by challenges or other causes.

TALFOURD, *tawl'fĕrd*, Sir THOMAS NOON, D.C.L.: 1795, Jan. 26—1854, Mar. 13; b. near Stafford, England: jurist and author. He was educated in a dissenting grammar school; studied law with Chitty; was called to the bar 1821; was member of parliament 1835–41 and 1847–49; and in the latter year was appointed a judge of the common pleas. He published many speeches, essays, critical and poetic and dramatic works, including *Poems on Various Subjects* (1811); *History of Greek Literature; History of Greece; History of the Roman Republic; Memoirs and Correspondence of Charles Lamb* (1837); and the tragedies *Ion* (1835), *The Athenian Captive* (1838), *Glencoe* (1840), and *The Castilian* (1854).

TALIAFERRO, *tŏl'ĭ-vĕr*, BENJAMIN: revolutionary soldier: 1750–1821, Sep. 3. He was a member of Morgan's rifle corps, and distinguished himself at the battles of Saratoga, Monmouth, and at the siege of Savannah; aide to Gen. Lincoln at Charleston 1780, and taken prisoner at its surrender in May. In 1784 he settled in Ga.; was a delegate to the Ga. constitutional convention 1798; a representative in congress 1799–1802, and later pres. of the state senate, and a judge of the superior court of the state. He died in Wilkes co., Ga.

TALIAFERRO, *tŏl'i-vĕr*, WILLIAM BOOTH: milit. officer: b. Belleville, Va., 1822, Dec. 28. He graduated at William and Mary College 1841; entered the U. S. army as capt. 1847, Apr. 9; was promoted maj. Aug. 12 following; and was mustered out 1848, Aug. 26. He was a democratic presidential elector 1856, and member of the state legislature for 10 years. In 1861, May, he was appointed col. in the Va. provisional army; 1862, Mar., brig.gen. in the Confederate army; and 1865, Jan., maj.gen. He was in the principal movements of the Army of N. Va., 1861–2; commanded the defenses on Morris Island, S. C., 1863, July, and on James Island, Aug.; and afterward commanded the district of S. C. Since the war, he has been connected with some leading educational institutions in Va.

TALIESIN, *tăl'i-sĭn* (interpreted 'Splendid Forehead'): Welsh bard, surnamed *Pen Beirdd*, 'chief of the bards': assigned by some writers to the 5th c., by some to the 6th, by others as late as the 12th c. Nothing is definitely known about him; but many poems supposed to have been written by him are preserved in the *Archæology of Wales*. See WELSH LANGUAGE AND LITERATURE.

TALIPED, n. *tăl'i-pĕd*, or TAL'IPES, n. *-pēz* [L. *tālus*, an ankle; *pes* or *pĕdem*, a foot]: scientific name for the disease called Club-foot (q.v.): the term *taliped* denotes also a person affected with club-foot.

TALIPOT, *tăl'i-pot* (or TAL'IPUT, *-pŭt*) PALM, or GREAT FAN PALM (*Corypha umbraculifera*): noblest palm of the E. Indies, native of Ceylon, Malabar, etc. It grows to the height of 60, 70, or even 100 ft.; and has a straight cylindrical trunk, crowned with a tuft of enormous palmate plaited leaves, which are divided near the outer margin into numerous segments, and are united to the trunk by spiny leaf-stalks. The leaves are usually about 18 ft. long, exclusive of the leaf-stalk, and 14 ft. broad; a single one being sufficient to protect 15 or 20 men from rain. At the age of 30 or 40 years, the tree flowers, and after ripening fruit generally dies. It produces a long, conical, erect spadix, rising 30 ft. from the midst of its crown of leaves, and dividing into simple alternate branches, the lower of which sometimes extend laterally 20 ft., the whole covered with whitish flowers and forming a beautiful and magnificent object. The fruit is very abundant, globose, and about an inch and a half in diameter. The leaves are used for covering houses, for making tents, and for many other purposes. On occasions of ceremony, every Singhalese noble is followed by an attendant, who carries above his head a richly ornamented T. P. leaf, which is capable of being folded up like a fan, and is then not thicker than a man's arm, and wonderfully light. The leaves of this palm are used in Malabar for writing upon, characters being traced on them with an iron style. They are prepared for this purpose by boiling, drying, damping, rubbing, and pressing. The soft central part of the stem, pounded and made into bread, has often been of great use in times of scarcity.

TALISMAN, n. *tăl'ĭs-mán* [F. and Sp. *talisman*—from Ar. *tilsam*, a magical image—from Gr. *telesma*, tribute, in late Gr. incantation, mystery—from Gr. *telos*, completion]: among *eastern nations*, a kind of charm, consisting of some magical figure engraved on metal or stone when two planets are in conjunction, or when a star is at its culminating point, and supposed to exert some protective influence over the wearer of it. T., in popular usage, is any object which can be carried about the person, endowed with certain imaginary influences or powers, as protective from evil; an amulet. The terms T. and Amulet (q.v.) are often considered nearly synonymous; but the proper distinctive peculiarity of the T. is its astrological character. Talismanic virtues have often been attributed to a peculiarly marked or formed egg; and instances are recorded, by various authors, of eggs hatched with (supposed) figures of comets or eclipses on them. A species of T. which has acquired celebrity is the Abraxas Stone (q.v.). A kind of T. now in use in Asia is a piece of paper on which the names of the Seven Sleepers and their dog are inscribed: pasted on the walls of houses, this is believed to be a protection against ghosts and demons. TAL'ISMAN'IC, a. *-mĭn'ĭk*, or TAL'ISMAN'ICAL, a. *-ĭ-kăl*, magical; having the properties of a talisman. TAL'ISMAN'ICALLY, ad. *-lĭ*.

TALK, n. *tawk* [Bav. *dalken*, to dabble, to speak imperfectly: Sw. *tolka*, to explain: Low Ger. *talk*, a daw, a tattling woman: Swiss, *talen*, to speak imperfectly (see TALE and TELL)]: conversation; familiar speech; subject of conversation; rumor; report: V. to speak, as in familiar conversation; to converse; to confer; to reason; to reprove gently; to influence with talk; to advise; to speak impertinently; to relate; to give account of. TALK'ING, imp.: ADJ. given to talking; loquacious: N. conversation. TALKED, pp. *tawkt*. TALKER, n. *tawk'ĕr*, one who talks; a loquacious person; a boaster. TALK'ATIVE, a. *-ă-tĭv*, fond of talking; loquacious. TALK'ATIVELY, ad. *-lĭ*. TALK'ATIVENESS, n. *-nĕs*, the quality or condition of being talkative; loquacity. To TALK SHOP, to discuss matters concerning one's own trade or business where inappropriate.—SYN. of 'talk, n.': conversation; colloquy; chat; discourse; conference; dialogue; communication; garrulity; loquacity.

TALL, a. *tawl* [perhaps from W. *tal*, tall, lofty]: high in stature; long and erect; high; lofty; in *OE.*, sturdy; lusty; bold; courageous; valiant; warlike. TALL'NESS, n. *-nĕs*, the state or quality of being tall; height of stature. TALL TALK, in *Amer. slang*, boastful and extravagant language.

TALLADEGA, *tăl-la-dē'ga:* city, cap. of Talladega co., Ala.; on the E. Tennessee Virginia and Georgia, the Alabama Mineral, and the Talladega and Coosa Valley railroads; 85 m. n.-by-e. of Montgomery, 109 m. n.n.e. of Selma. It contains co. court-house, 7 churches, bank, 2 weekly newspapers, iron furnace, milling-works, and several manufactories. T. is the seat of Talladega College (Congl.), excluding none on account of color or race, chartered 1869; which had (1901-2) 28 instructors, 534 students, 7,500 vols. in lib., $92,200 in grounds and buildings, $137,500 in productive funds, $30,412 in benefactions; G. W. Andrews, A.B., M.A., pres. T. is the seat also of the combined state deaf and dumb (opened 1858) and blind (1888) institution, which had (1888-9) 27 instructors, 159 pupils, $29,000 receipts, and in 1901 27 instru. and 159 pupils. Pop. (1890) 2,063; (1900) 2,661.

TALLAGE, n. *tăl'lāj*, or TAL'LIAGE, n. *-lĭ-āj*, or TAILAGE, n. *tāl'āj* [F. *taillage*—from *tailler*, to cut (see TAILOR)]: impost; excise. In its more proper and restricted sense, it denotes those taxes to which, under the Anglo-Norman kings, the demesne lands of the crown and all royal towns were subject, which were far more rigorous and irregular than the taxes imposed on the gentry. TALLAGE, v. to lay on a tax or impost.

TALLAHASSEE, *tăl-a-hăs'ē:* city, cap. of Leon co. and of the state of Fla.; on the Florida Central and Peninsular railroad; 26 m. n. of the Gulf of Mexico, 160 m. w. of Jacksonville, 230 m. e. of Mobile. It is in a farming and fruit region; contains the state capitol, co. court-house, Univ. of Fla., the Seminary West of the Suwanee River, Lincoln Acad. for advanced instruction of colored youth, a state normal school for the same, 10 churches, and 2 weekly newspapers. It has railroad car and machine shops, cotton factory, and considerable general trade. Pop. (1880) 2,924; (1890) 2,934; (1900) 2,981.

TALLAPOOSA, *tăl-a-pō'sa:* town in Haralson co., Ga.; on the Georgia Pacific r.r. and the Piedmont plateau; 63 m. w. of Atlanta, 1,200 ft. above sea-level. It is surrounded by picturesque hills and valleys, is a natural sanitarium for winter and sum. resort. The discovery that the Piedmont range abounded in rich iron ores, specular and manganese, and that it was the only region besides the Lake Superior and an undeveloped tract in Ark. where steel-making and Bessemer ores could be obtained in large quantities, attracted capitalists from the New England and other northern states to T., and induced development of its mineral wealth. The town contains churches and schools, and has electric light and gas plants; waterworks; cotton-goods and furniture factories; planing and saw-mills; brick-yards; sash, blind, and door, broom, and wagon factories; cotton-knitting and cotton-hosiery mills; 1 state bank (cap. $50,000); and 1 weekly newspaper. Pop. (1890) 1,699; (1900) 2,128.

TALLEYRAND DE PÉRIGORD, *tăl'lĭ-rănd*, F. *tâ-lâ-rŏng' dĕh pā-re-gor'*, CHARLES MAURICE, Prince of Benevento: the most subtile, shrewd, and unprincipled of all modern diplomatists: 1754, Feb. 2—1838, May 17; b. Paris, of ancient and distinguished family; son of Charles Daniel, Comte de T. (1734–88), officer in the army of Louis XV. T., being the eldest son, would probably have entered on a military career, had not an accident in infancy lamed him for life. He was, in consequence, deprived of his right of primogeniture; was intrusted to strangers for his bringing up; and was trained for the priesthood, studying at St. Sulpice, the Sorbonne, and Rheims. He despised his enforced profession, using it only as an aid in his ambition, and never showing the least inclination toward a Christian or even a moral life. Yet he always held the study of theology in high estimation as a training for a public career. At the age of 20 he came to Paris, and rapidly acquired a reputation for licentiousness; though this did not prevent his obtaining several ecclesiastical benefices—among others, the abbacy of St. Denis, in the diocese of Rheims (1775). Appointed *agent-général* for the clergy 1780, a lucrative and important post, which brought him into close connection with the heads of the administrative in France, he began a serious apprenticeship to public business, without, however, pausing in his career of gallantry. So notorious was his *infâme conduite* (as Mirabeau calls it), that for years Louis XVI. shrank from conferring on him further ecclesiastical preferment; but 1789, Jan., he was made bp. of Autun. When the convocation of the *États-généraux* took place, in the year following, he was elected by the clergy of his diocese to represent it, and pronounced in favor of an amalgamation with the *Tiers Etat*, which, June 17, had constituted itself the *Assemblée Nationale*. His attitude and speeches recommended him to the popular party, and with Mounier, Sieyès, and Lally-Tollendal he was appointed to draw up a constitution for the nation. In this capacity he was active in framing the famous Declaration of Rights, and he was one of those selected (after the destruction of the Bastile) to investigate the causes and peculiar features of the revolutionary movement. It was T. who proposed (1789, Oct. 10) the startling measure for confiscation of church property, arguing that such property belonged really to the nation, and that, if the rights of the existing clergy were secured, the nation, or its representatives, were at liberty to apply it to any purpose they saw fit. 1790, Feb. 13, a decree for suppression of religious orders was carried, in spite of vehement opposition, and three days later T. became pres. of the assembly. He was one of the first among the bishops to take the oath to obey the constitution, and urged the clergy of his diocese to follow his example; also, he consecrated two new bishops chosen by the assembly. For his action the pope excommunicated him; and he immediately abandoned his clerical profession.

T. had important share in the financial deliberations of this first period of the Revolution. Specially notable was

his sagacity in pointing out the perils attending the issue of assignats; his skill in preparing the way for the adoption of the principle of uniformity in weights and measures, and of an arc of a meridian as the basis of the new metrical system; and above all, the luminous intelligence shown in the Report which he gave in to the assembly, 1791, Sep. 10, 11, on Public Instruction—a Report conceived in the liberal and comprehensive spirit of the times, and which gave the model followed in all the great subsequent changes when France reorganized her educational system. Indeed, T.'s magnificent scheme, with slight modifications, is the French system to-day.

In 1792, when the old European despotisms were obviously preparing to coerce the young republic, T. was sent to London—though not in an openly official character—to negotiate with the English government. He did not make a favorable impression on George III. or on Pitt. Thrice, in that year, he essayed to procure a recognition of the republican govt., but in vain. The 'September massacres' (see SEPTEMBRISTS) made even the stanchest British admirers of the Revolution shudder. Nothing, therefore, could be done; and T. would doubtless have returned to France, had not a letter of M. de Laporte, *intendant* of the civil list of Louis XVI., been discovered, in which T. was noted as a man 'disposed to serve' the king. He was immediately placed on the list of *émigrés*, i.e., proscribed (1792, Dec.); thus his connection with the Revolution—fortunately, we believe, for his reputation—was suddenly ended. His career as an exile, was one of hardship and insignificance. He remained in England till forced to leave by the 'Alien Bill,' when, with a letter of introduction from Lord Lansdowne to Washington, he sailed for the United States (1794, Feb.), where he remained more than a year. After the fall of the Terrorists, he procured the revocation of his banishment; and 1796, Mar., reëntered Paris, having paved the way for a favorable reception by a series of adroit and judicious intrigues. He was received with enthusiasm in fashionable circles; and in private life he continued to play the *rôle* of a gay Lothario.

T. attached himself to the *cercle constitutionel* that gathered round Madame de Staël; and so dexterously did he comport himself, that, 1797, he was named minister of foreign affairs in place of C. Delacroix. The rise of Bonaparte was a phenomenon which so penetrating a politician as T. could not fail to see in its beginning. He cultivated the friendship of the young general with sagacious assiduity, keeping him constantly *au courant*, when away from Paris, of the situation of parties; and became his confidant in those designs, whose execution resulted in the overthrow of the Directory, Brumaire 18 (1799, Nov. 9). After this *coup d'état*, the subtle finesse of T. was constantly in requisition. He divined, with miraculous cleverness, the ideas of Bonaparte, and his whole policy was directed to consolidate the power and authority of his master. In all the diplomatic negotiations that followed the victories of France under the consulate, he had the principal part;

but Bonaparte thoroughly understood his man, and T. was quite conscious, as M. Thiers remarks, that he could never impose on his superior. It was he who proposed the kidnapping of the Duke d'Enghien (q.v.); and it was by his instructions that the crime was consummated, in spite of the vehement opposition of Josephine, whose honest indignation led her to denounce him, as a *maudit boiteux* (cursed cripple). T. took active part in preparing for the establishment of the empire (1804); and when, in the following year, England, dreading a French invasion, formed a powerful European coalition against France, it was by the ingenuity of T. that it was partially broken up. To him, as much as to Napoleon, was owing the organization (1806) of the famous *Confederation of the Rhine* (q.v.), which so effectually served the ambitious designs of the emperor. In the negotiations that brought about this Confederation, he exhibited a truly Macchiavellian art. Napoleon was not ungrateful: T. was made a prince of the empire, receiving the principality of Benevento as an imperial fief.

When the views of the emperor in regard to Spain became apparent, T., who for more than a year had somewhat lost favor with Napoleon, came forward with a plan of his own, which, however, was not adopted; but his presence at the interview between Alexander and Napoleon at Erfurt (1808), proved that his influence was as yet undiminished. The ill success of the Spanish war (at first) induced T. to dubiousness in his approval of it; and this, with other disagreements, occasioned violent invectives on the side of his sovereign, to which the accomplished cynic (who retained to the last the manners of the old noblesse) replied only by the sarcasm: '*Quel dommage qu'un si grand homme soit si mal élevé!*' (What a misfortune that so great a man should have been so badly brought up!). T. declared in favor of the Austrian marriage; but already the *entente cordiale* between him and Napoleon was ruptured, and he began to look forward to a future in which his own schemes might be hostile to those of the emperor: in a word, he was meditating treachery. The victories of Wellington in Spain, and the reverses of Napoleon in Russia and Germany, widened the breach; and T. now only waited the decisive moment in which to ruin the cause of his master. He became the centre of a group of Parisian malcontents, whose influence grew with the advance of the allied armies, and finally communications were opened with the latter and with the Bourbons. It was T. who dictated to the senate the terms of the deposition of Napoleon; and on the restoration of the Bourbons, he became minister of foreign affairs in the first govt. of Louis XVIII. He was also head of the French legation in the celebrated Congress of Vienna; and at this period he rendered to France splendid services, most helpful in her time of humiliation. After the battle of Waterloo, and the second restoration, a coldness sprang up between him and the Bourbons, a strong party under Chateaubriand cordially hated him, and he was relieved of all his offices. He caballed to regain power, but in vain; and during the

reigns of Louis XVIII. and Charles X., he was merely a discontented senator, who never lost an opportunity of injuring the court and the government. After the July revolution, Louis Philippe employed him as ambassador at the English court, where he contrived to bring about a friendly feeling between the new monarchy and the English government. He died at Paris.

T. was not wise, nor great, nor good; but he was, almost without parallel, cunning, dexterous, and supple. He had a larger share than most men of what Carlyle calls 'vulpine understanding;' and if this world had been populated only by knaves and fools, the policy and principles of T. might have had perpetual triumph; but there were forces in the world, both intellectual and moral, of which he took no account, but which took account of him, and notwithstanding all his amazing cleverness allowed the great diplomatist to lapse into obscurity. T. was an 18th c. skeptic, over whom the Revolution had exercised little influence, while France, and indeed all Europe, had been roused into earnestness by the outburst; and when the first crude ideas of political liberty had found their true basis and begun their orderly development, this brilliant, subtle, unscrupulous intriguer had nothing to contribute toward realizing the new ideals, and sank out of sight.—T. left *Mémoires*, not to be published till 1890: they are (1892) in process of publication. For estimates of his character and policy, see *Mémoires Politiques* of Lamartine; *Histoire de Dix Ans* of Louis Blanc, where T. is rigorously criticised; *Mémoires* of Guizot; works by Mignet and Bastide; *Correspondance inédité du Prince T. et du Roi Louis XVIII.* (2 vols. 1881; Eng. transl. 1881), ed. by Pallain; Sir Henry Lytton Bulwer in *Historical Characters;* and Taine's lectures (1870).—The reader of historical notices of T. may wisely remind himself of the temptation to paint such a character in lines of too unmitigated blackness; while, on the other hand, such a man's statements regarding himself need corroboration by the evidence of his contemporaries.

TALLICOO'NAH OIL: see CARAPA.

TALLIEN, *tà-le-âng'*, JEAN LAMBERT: French revolutionist, and leader in the overthrow of Robespierre: 1769-1820, Nov. 16; b. Paris. He became notable in the beginning of 1792 as editor of a Jacobin journal, *L'Ami des Citoyens*, a friendly rival of Marat's *Ami du Peuple*. From this date, his influence over the lower orders of the city steadily increased. He was conspicuous in the events of Aug. 10, and in consequence received the appointment of sec. to the *Commune Insurrectionelle*. He promoted and afterward defended the massacres of September; and for his unscrupulous zeal was elected to the convention by the dept. Seine-et-Oise. There he became the apologist, if not the advocate, of Marat, denounced the minister Roland, urged with savage emphasis the condemnation of Louis XVI., and was eager for the ostracism and annihilation of the Girondists (q.v.). Toward the close of 1793, he was sent to Bordeaux, charged to destroy every trace of

the party that he hated. His career in the s.w. was a mixture of reckless cruelty and shameless vice. To the odious tyrannies of a proconsul, he added the luxurious profligacy of a satrap. Fortunately for his countrymen, a passion which he conceived for one of his victims, a woman of surpassing beauty, Madame de Fontenay (*née* Cabarrus), caused him to pause in his bloody course. He was called to Paris to account for this singular change, but satisfied his associates by paroxysms of patriotic vehemence, and 1794, Mar. 22, was chosen pres. of the convention. Robespierre, however, had penetrated T.'s character, and hated him for his insincerity and immorality, felt instinctively that he could not be trusted, and denounced him in the convention. T. recognized his danger; and, taking advantage of the reaction then beginning to show itself against the Terrorists (though himself one of the basest of the set), he dexterously rallied the Dantonists, Hébertists, and others against the rigorous government of Robespierre, St. Just, and Couthon, and brought about the events of the 9th Thermidor (1794, July 27), which caused the fall of the triumvirate. T. now became for a short time one of the most notable men in France; lent his aid to suppress the Revolutionary Tribunal and the Jacobin Club; and drew up the accusations against Carrier, Le Bon, and others of the Terrorists. But France could not long tolerate this affectation of virtue from one so infamous; and finally, 1798, May 20, he was forced to leave the Council of Five Hundred. Thereafter his career was insignificant. He accompanied Bonaparte to Egypt as *savant;* quarrelled with General Menou; and on his return to France was captured by an English cruiser, and brought to England, where the whig opposition was stupid enough to make a hero of him (1801). Soon afterward he returned to France, and was contemptuously dismissed as consul to Alicante by Talleyrand, outlived (in utter obscurity) the empire of Napoleon, and died at Paris, in abject poverty, supported in his last days by the heirs of the monarch for whose death he had inhumanly clamored.

TALLIS, *tăl'ĭs* (TALLYS, TALYS, or TALLISIUS), THOMAS: 'father of English cathedral music': about 1515–1585, Nov. 23. After being a chorister at St. Paul's and at the chapel royal, and organist at Waltham Abbey, he was appointed a gentleman of the chapel royal, and held that position during the reigns of Henry VIII., Edward VI., and Mary. He became the organist of that chapel on the accession of Elizabeth. His many compositions, all religious, are, of their kind, unexcelled, if not unequalled, and show that he was not only a master of counterpoint, as illustrated in his *Song of Forty Parts,* but also that his musical scholarship was profound and his genius many-sided. For his *Discursus Cantiones Sacræ,* published in conjunction with his pupil William Byrd, Elizabeth granted the two a patent of protection and for the exclusive right of printing music, etc., for 21 years.

TALLMADGE, *tăl'mĭj*, BENJAMIN: soldier of the Amer revolution: 1754, Feb. 25—1835, Mar. 7; b. Setauket, L. I. He graduated at Yale Coll. 1773. At the beginning of the war, he enlisted; was promoted to major; and had custody of Maj. André during the latter's imprisonment. He participated in important battles in Penn. To him was due the inception and execution of a successful plan to capture a body of 500 tories on L. I.; also to take Ft. George on the n. shore of L. I., at Oyster Bay, and destroy the enemy's stores. Raised to a colonelcy before the end of the war, he afterward became a merchant at Litchfield, Conn., where he died. For 16 years from 1801 he served in congress.—His son FREDERICK AUGUSTUS T., 1792–1869, Sep. 17; graduated at Yale 1811, and at the Litchfield Law School; practiced law in New York; was captain of cavalry in the war of 1812; state senator 1837–40, and presided; recorder of New York 1841–46 and 1848–51; and was credited with official decision in dealing with the Astor Place riot raised by the friends of the tragedian Forrest against the rival Macready. He filled other offices, and was in congress 1847–49. He died in Litchfield.

TALL'MADGE, JAMES, LL.D.: statesman: 1778, Jan. 28—1853, Sep. 29; b. in Dutchess co., N. Y. He graduated at Brown Univ.; practiced law in New York; and was in congress 1817–19, taking an active part on the side of freedom in the exciting debates on admitting Mo. as a free state, and making a notable speech on the subject 1819, Feb. He was prominent in the state constitutional conventions 1821 and 46, in the legislature 1825, and as lieut.-gov. 1826–28. For nearly 20 years he was pres. of the Amer. Institute, and collected much material for it, especially in Russia, where he introduced cotton machinery. In the war of 1812, he was commissioned brig. gen., but commanded only home-guards in New York, the city of his residence and death. Among his eloquent public addresses were those at the reception, and on the death, of Lafayette.

[See also, TALMAGE.]

TALLOW, n. *tăl'lō* [Ger. *talg;* Dut. *talk;* Icel. *tolgr*, the solid fat of ruminants: Ger. *talgen*, to daub]: the fat of ruminant animals, separated from the membranes by melting down (see OILS—including the Fats): V. to smear or grease with tallow; to fatten. TAL'LOWING, imp. TAL'LOWED, pp. *-lōd:* ADJ. greased with tallow. TAL'LOWER, n. *-ĕr*, one who deals in tallow; an animal which fattens readily. TAL'LOWY, a. *-lō-ĭ*, or TAL'LOWISH, a. *-lō-ĭsh*, like tallow; greasy. TALLOW-CHANDLER, one who makes and sells candles. TALLOW-CHANDLERY, the shop or occupation of a tallow-chandler. TALLOW-FACED, having a pale sickly complexion. MINERAL-TALLOW, one of the mineral resins, a light, soft, fatty substance of a greenish-yellow color; also called *hatchetine* (see MINERAL-TALLOW). VEGETABLE TALLOW, a kind of fat-like tallow obtained from various plants.

TAL'LOW TREE: name given in different parts of the world to trees of various kinds which produce a thick oil or vegetable tallow, or a somewhat resinous substance which, like tallow, is capable of being used for making candles. The T. T. of Malabar (*Vateria Indica*) is a very large tree of nat. order *Dipterocarpaceæ:* it has leathery leaves 4–10 ft. long, and panicles of white, fragrant flowers, with five petals. The stem is often 16 ft. in circumference. By incisions in the stem, E. Indian copal is got; and by boiling its seeds, there is obtained a firm, white, vegetable tallow, which, as it has no unpleasant smell, is particularly suitable for making candles and soap.—The T. T. of China (*Sapium sebiferum*, or *Stillingia sebifera*) belongs to the nat. order *Euphorbiaceæ:* the capsules are internally divided into three cells, each containing a nearly hemispherical seed covered with a beautifully white vegetable tallow. This the Chinese collect for manufacture of candles, in order to which the capsules and seeds are crushed and boiled, and the fat skimmed off while melted. To give it firmer consistency, wax is added in the proportion of three parts to ten of the vegetable tallow; linseed-oil also is added. The candles made of it are beautifully white. This tree has been introduced into India, W[illegible] dies, and the s. states of the American Union. It is [illegible]tivated about Charleston and Savannah, and is almost naturalized in maritime parts of N. and S. Carolina. It presents a beautiful and remarkable appearance at the approach of winter, when the leaves become bright red, and the pericarps falling off, leave the white seeds suspended by threads. The wood is very hard and is much used for printing-blocks.—The name T. T. is sometimes given in N. America to a species of CANDLEBERRY (q.v.).—The T. T., or BUTTER AND TALLOW TREE of Sierra Leone is *Pentadesma butyracea*, of nat. order *Guttiferæ*, whose fruit furnishes a solid oil.

TAL'LY: one of the notched sticks which, so late as the reign of George III., were used in England for keeping accounts in exchequer, answering the double purpose of receipts and public records. They were well-seasoned rods of hazel or willow, inscribed on one side with notches indicating the sum for which the tally was an acknowledgment, and on two opposite sides with the same sum in Roman characters, with the name of the payer and the date of the transaction. Different kinds of notches, differing in breadth, stood for a penny, a shilling, a pound, £20, £100, and £1,000. The tally was cleft through the middle by the deputy-chamberlain with knife and mallet, so that each piece contained one of the written sides and a half of every notch; and the one half was retained by the payer as his receipt, while the other was preserved in exchequer. The destruction of the houses of parliament by fire 1834 is attributed to overheating of the flues in which the discarded tallies were being burned.

TALLY, n. *tăl'lĭ*, plu. TAL'LIES, *-lĭz* [F. *tailler;* It. *tagliare*, to cut: F. *taille*, a tally (see TAILOR)]: stick on which notches or scores were cut corresponding to the notches cut on another stick—formerly used as a method of keeping and checking accounts (see below): anything made to suit or correspond to another; a label or ticket of wood or metal: V. to make to correspond; to correspond; to fit; to match; to suit; to keep tally. TAL'LYING, imp. TAL'LIED, pp. *-lĭd*, agreed; fitted; suited. TAL'LIER, n. *-lĭ-ĕr*, one who keeps tallies to check accounts—now spelled TELLER, which see. TAL'LYMAN, one who sells for weekly payments, or payments for other short periods. TALLY-SHOP, a shop where goods can be obtained to be paid for by weekly or monthly payments.

TALLY-HO, int. and n. *tăl'lĭ-hō'* [corrupted from F. *taillis au!* to the coppice!]: the huntsman's cry to his hounds; a pleasure coach.

TALLY SYSTEM: mode of buying goods in vogue in England among the wives of poor men, whereby they get goods, chiefly articles of dress and cheap finery, on credit, or on terms of payment by small weekly sums till the debt is paid.—The same mode under a different name, and not restricted to purchases by women, is practiced to some extent in this country.

TALMA, n. *tăl'ma* [prob. after *Talma*, the French tragedian]: a kind of large cape or short full cloak, worn by ladies, and sometimes by gentlemen.

TALMA, *tăl'ma*, F. *tăl-mâ'*, JOSEPH FRANCIS: eminent French tragedian: 1763, Jan. 15—1826, Oct. 19; b. Paris. He made his *début* as an actor 1787, at the Comédie Française, where he played the part of Séide in *Mahom.* He achieved considerable success, but excited no very high anticipations of his future career; and for more than a year he figured only in secondary characters. He gained public attention first by an innovation in costume in the part of Proculus in the tragedy of *Brutus.* Previously, actors had worn the garb of their own country and their own time; and Roman senators stalked about the stage dressed as Parisian 'swells' of the 18th c. Discarding this absurdity, T. appeared in the green-room clothed in a Roman toga, to the astonishment of the company, one of whom (Louise Contat) exclaimed: 'Look at Talma; how ridiculous he is! *Why, he has quite the air of an ancient statue!'* T.'s first grand triumph in acting was won 1789, Nov. 4, when he played Charles IX. in Chenier's drama. During the Revolution, he was in the zenith of his popularity, and made peculiarly his own such characters as Abdelazis, in *Abdelazis et Zuléma;* Othello; Néron, in *Epicharis et Néron;* Pharan, in *Abufar;* and Egisthe, in *Agamemnon.* T. had perfect physical gifts for the highest tragedy, and a voice of singular beauty and power, with an admirable elocution Exceedingly arrogant and choleric, he was often at strife, either with the public or with his fellow-actors. T. was a favorite with Napoleon and Louis XVIII. Some of his later characters were among his

Talipot Palm.

Tamarisk.

Tamarin.

Tally.

Indian Tam-tams.

best, as Marigny, in *Les Templiers;* Leicester, in *Marie Stuart;* Sylla; Oreste in the *Clytemnestre;* Leonidas; and Charles VI. See his *Mémoires* (4 vols. 1850).

TALMAGE, *tăl'mĭj*, THOMAS DE WITT, D.D.: Presbyterian clergyman, lecturer, and author: b. Bound Brook, N. J., 1832, Jan. 7. He graduated at New York Univ. 1853; and at New Brunswick Theol. Seminary (Ref. Dutch) 1856, was pastor of the Ref. Dutch Chh., Belleville, N. J., 1856–59, at Syracuse, N. Y., 1859–62; in Philadelphia 1862–69; and chaplain of a Penn. regt. in the war. Since 1869 he has been pastor of the Central Presb. Chh., Brooklyn, N. Y., moving into a new amphitheatrical 'Tabernacle' 1870, which was enlarged 1871, burned 1872, rebuilt 1873, and burned 1889, after which he preached in the Acad. of Music until a new and immense edifice was ready for occupancy 1891 on Clinton ave., a district noted for its large supply of churches. While this last church was building, Dr. T. visited Palestine; and in 1894 this church was burned, and has not been rebuilt; loss $300,000. In 1895 he removed to Washington, D. C., to become associate pastor of the Presb. church conducted by Dr. Byron Sunderland, meantime editing the *Christian Herald* (New York), and travelling and speaking extensively through the U. S. He was a speaker of unstinted expression and action, thoroughly orthodox and evangelical, with a vein of poetic originality and reputed extravagance, and he always drew and interested great audiences as a preacher and frequent lecturer. His lectures were richly spiced with anecdotes, and delivered with dramatic elocution and action. In denouncing current error and vice, he was outspoken. His sermons, it is said, were published weekly in 600 journals, and trans. into Norwegian, Russian, German, French, etc. He was editor of *The Christian at Work,* and *Frank Leslie's Sunday Magazine.* Among his many books published are: *The Almond Tree in Blossom* (1870); *Crumbs Swept Up* (1870); *Sermons,* 4 vols. (1872–75); *Abominations of Modern Society* (1872); *Old Wells Dug Out* (1874); *Shots at Targets,* and *Around the Tea-table* (1874); *Sports that Kill* (1875); *Everyday Religion* (1875); *Night Sides of City Life* (1878); *Masks Torn Off* (1879); *The Brooklyn Tabernacle* (sermons, 1884); *The Marriage Ring* (1886); *The Battle for Bread* (1886); *Great Britain through American Spectacles,* and *The Keynote of the Temperance Reformation* (1890). Extracts from his sermons, relating especially to vices and recent skepticism, have been published by L. C. Lockwood under the title *Trumpet Peals.* He died 1902, April 12.

TALMI-GOLD, n. *tăl'mē-* [etym. doubt.]: Abyssinian gold.

TALMUD, n. *tăl'mŭd* [Chald. *talmûd*, instruction: Heb. *talmid*, a scholar—from *lâmad*, to learn]: body of fundamental Jewish laws, comprehending the laws of Moses, the expositions and amplifications of the rabbins thereon, and a collection of traditions: the book or books containing them (see below). TALMUDIC, a. *tăl-mŭd'ĭk*, or TALMUD'ICAL, a. *-ĭ-kăl*, pert. to or contained in the Talmud. TALMUDISTIC, a. *tăl'mŭd-ĭs'tĭk*, pert. to the Talmud. TALMUDIST, n. *tăl'mŭd-ĭst*, one learned in the Talmud.—The *Talmud* is the fundamental code of the Jewish civil and canonical law, comprising the Mishna (q.v.) and the Gemara (q.v.), the former as the text, the latter as the commentary and complement. See HALACHA and HAGGADA, for the gradual development of this 'Oral' Post-Mosaic Code; also for mention of the older collections on which the Mishna was framed and finally redacted in the form in which we now possess it. The oldest codification of Halachoth, or single ordinances, is due to the school of Hillel (q.v.). Simon ben Gamaliel the Patriarch (A.D. 166) and his school carefully sifted the material thus brought together; and in the following generation, through Jehudah Hanassi (219 A.D.) and his disciples, the work was brought to its close in six portions (Sedarim), 63 treatises (Mesichtoth), and 524 chapters (Perakim), which contain the single Mishnas: for summary of its contents, see MISHNA. But besides this authoritatively compiled code, there were other law collections, partly anterior to it and not fully embodied in it, partly arising out of it—as supplements, complements, by-laws, etc.—partly portions of the ancient Midrash (q.v.), partly either private text-books, composed by the masters of the academies for their lectures, or enlargements of the existing Mishna. All this additional legal material was collected, often together with the dissensions which begot it, under the name *Boraitoth*, by Chia and his school, in the succeeding generation. Not to be confounded with these, however, are the collections of *Toseftas* or *Great Mishnas*, which, beginning at the time of Jehudah Hanassi himself, and continued after his death by Chija and Hoshaja, embody much of what has been purposely left out in the concise Mishna, which comprised only the final dicta and decisions. Such 'additions' we possess now to 52 of the treatises, forming together 383 Perakim or chapters. All these different sources of the 'Oral Law'—finally redacted before the end of the 3d c., though probably not committed to writing until 550—belong to the period from about B.C. 30 to about A.D. 250. This great mass of legal matter, though apparently calculated to provide for every case, if not for all times, was yet found insufficient: dicta of later masters, decisions of courts, discussions on the meaning and purport of special traditions, attempts at reconciling apparent contradictions in the received material, amplifications or modifications of certain injunctions rendered necessary by shifting wants and conditions of the commonwealth—all these and other circumstances made further codification peremptory.

This Mishna (Mathnisin), though it contained only in-

digenous laws and institutions, was yet not a little influenced—if its very redaction was not indeed caused—by the spirit of the times. At Berytus, at Alexandria, at Rome, the legal schools were then in their most vigorous stage; and everywhere system and method were being introduced into the vast complex of traditional and popular institutions, decrees, and decisions. The Mishna fulfilled all reasonable requirements for such a text-book; it was clear, concise, complete, and systematic; and was in as classical a Hebrew as still could be written in those days of decadence of the 'sacred language.'

The further development of this Supplementary, Oral, or Second Law, in fact rather an exegesis thereof, together with the discussions raised by apparent contradictions found in the individual enactments of the Mishnic doctors, is called Gemara, i.e., discussion, complement, or, according to another explanation, doctrine. This Gemara contains, apart from the Halacha (q.v.) which is generally in Aramaic, also a vast number of non-legal, chiefly Hebrew, fragments—homiletic matter, tales, gnomes, legends, and the like—called Haggada (q.v.).

There are two Talmuds: one called the T. of the Occidentals, or the 'Jerusalem' (Palestine) T., which was closed at Tiberias; the other, the 'Babylonian' T. The first of these now extends over 39 treatises of the Mishna only, though it formerly existed to the whole of the first five *Sedarim* or portions. Its final redaction—falsely attributed to R. Jahanan (died 279)—belongs probably to the end of the 4th c. There is less discussion and more precision of expression in this than in the second or Babylonian T., emphatically styled 'our Talmud,' which was not completed until the end of the 5th c., and which makes use of the former. Rabbi Ashe, pres. of the academy of Syra in Babylon (365-427), is to be regarded as the real editor of the Babylonian T. Both the Mishna and the Palestine Gemara had, notwithstanding the brief period since their redaction, suffered greatly, partly by corruptions in their (unwritten) text through faulty traditions, partly through the new decisions arrived at independently in the younger schools—of which there flourished many in different parts of the Dispersion—and which were at times contradictory to earlier decisions. To end these disputes, whose confusion threatened to end in chaos, R. Ashe, aided by his disciple and friend Abina, or Rabina (abbr. from Rab Abina), commenced the cyclopean task of collecting anew the enormous mass of Halachistic material which by that time had grown up. His method was simple. His disciples met twice a year at Syra, in spring and in autumn. At the spring gathering, he gave out all the paragraphs of one treatise; and the disciples had the task to find out until the autumn meeting what opinions the different schools had pronounced on the special points thereof: he then investigated the whole critically, and put it into shape according to a certain order. This process occupied him, with assistance of ten secretaries, no less than 30 years; and another 30 years were spent by him in the

revision in the same manner. The final close of the work, however, is due, not as generally stated, to R. Jose, his successor at the acad. (died 475), but to the school of the Saburaim at the end of the 5th century.

The Babylonian T., as now extant, comprises the Gemara to almost the whole of the 2d, 3d, and 4th *Sedarim* (portions), further to the first treatise of the first, and to the first of the last order: the rest, if it ever existed, seems now lost. The whole work is about four times as large as the Jerusalem T., and its 36 treatises, with the commentaries generally added to them in our editions (Rashi and Tosafoth), fill 2,947 folio leaves. The language of the T. is Aramaic (Western or Eastern), or 'Chaldee,' closely approaching to Syriac. The minor idiomatic differences between the two, are easily accounted for by the different time and place; but the additional matter—quotations and fragments from older Midrash and Gemara collections, Haggada, etc.—is, as above stated, principally in Hebrew.

The masters of the Mishna (Tanaim) and of the Gemara (Amoraim) were followed by the Saburaim (see above). The code of the Oral Law had come to a close with the Gemara; and not its development, but rather its proper study, elucidation, and carrying into practice, was the task of the generations of the learned that followed. Apart from this, the Aramaic language itself began to die out as the popular language, and required further study. The Saburaim no longer dared to contradict, but only gave opinion on the meaning and practicability of certain enactments, and undertook the task of inculcating and popularizing the teachings of their sires: apart from bestowing proper care on the purity of the text itself, and adding some indispensable glosses. Their activity was at its height in the 8th c., when Karaism (see JEWISH SECTS), which utterly denied the authority of the T., sprang into existence. Respecting, however, this authority of the T. itself, there has never been anything approaching to a canonicity of the code, or of a reception of it as a binding law-book by the whole Jewish nation. The great consideration in which it was always held is due, partly to its intrinsic value, and to the fact of its becoming the basis of all further development of Jewish literature (it being undeniably the most trustworthy receptacle of the traditional Jewish law); and partly to a prosecution against the Jews in the persian Empire at the time of Jesdegerd II., Firuz, and Kobad, who closed the schools and academies for nearly 80 years, during which this book was the sole authoritative guide of public conscience, and retained its importance even when the schools had been restored. The best commentaries of the Mishna are by Maimonides and Bartenora; of the Babylonian T. by Rashi (q.v.) and the *Tosafists* of France and Germany. An abstract of the T. for practical (legal) purposes by Maimonides (q.v.) is called Mishne Thorah. The Mishna was printed first at Naples 1492; the T. of Jerusalem at Venice about 1523. The Babylonian T. was published first at Venice 1520: it is printed generally in 12 folios, the text on the single

pages being kept uniform with the previous editions to facilitate the references. No translation of the Gemara has ever been carried further than a few single treatises. The complete Mishna, on the other hand, has been translated repeatedly into Latin, German, Spanish, etc., by Surenhûs, Rabe, Jost, and others.

The T. is a work completely *sui generis*. It will assuredly, when properly investigated, prove one of the most important records of humanity. No statement that can here be made can give even an approximate idea of the immensity of material, historical, geographical, philological, poetical, that lies hidden in its mounds. A contribution to the records of fanaticism also may be found in the 'exoteric' history of the Talmud, which was—though utterly unknown except by a few garbled extracts—prohibited, confiscated, burned, and generally prosecuted and inveighed against by emperors, popes, theologians, and fanatics generally, from Justinian down almost to the present day. In our own times its value begins to be recognized by scholars, not merely as the source for knowledge of Judaism, but as the chief source—next to the gospels—even for the history of the origin and early days of Christianity; a notion long ago hinted at by eminent divines like Lightfoot and others.—See JEWS: MIDRASH: MISHNA: HALACHA: HAGGADA: and a very important essay in the *Literary Remains* of Em. Deutsch.

TALON, n. *tăl'ŏn* [F. *talon*—from L. *tālus*, the heel: It. *tallone*, the heel]: the claw of a bird of prey; in *arch.*, the ogee molding.

TALOOK, n., or TALUK, n. *tŭ-lŭk':* in the *E. I.*, a district or dependency, the revenues of which are administered by a talookdar. TALOOK'DAR, n. *-dŭr*, in the *E. I.*, the native head of a department acting under a superior.

TALPA, n. *tăl'pă*, plu. TAL'PÆ, *-pē* [L. *talpa*, a mole]: the common mole; in *surg.*, a tumor under the skin; an encysted tumor on the head. TAL'PIDÆ, n. plu. *-pĭ-dē*, the family of moles: see MOLE.

TALUS, n. *tā'lŭs* [L. *tālus*, the ankle]: in *anat.*, the ankle-bone: a kind of club-foot: in *arch.* or *fort.*, the slope of a wall which diminishes in thickness as it rises: in *geol.*, a sloping heap of fragments at the bottom of a rocky declivity, and which accumulates from its weathered and wasted surface.

TAMABLE, TAMABLENESS: see under TAME.

TAMAQUA, *ta-maw'kwa:* borough in Schuylkill co.; Penn.; on Little Schuylkill river, and the Philadelphia and Reading and the New Jersey Central railroads; 16 m. n.e. of Pottsville, 98 m. n.n.w. of Philadelphia. It is lighted by gas; has improved water service; and contains 13 churches, high school, graded public schools, opera-house, 1 national bank (cap. $100,000), 1 state bank (cap. $47,130), and 3 newspapers. T. has considerable trade in manufactures of iron, machinery, and coal. Pop. (1880) 5,730; (1890) 6,054; (1900) 7,267.

TAMARACK, *tăm'a-răk:* name in the middle, southern, and western states for the Larch (q.v.).

TAMARA SPICE, *tăm'a-râ:* favorite mixture of condiments used by the Italians; consisting of powdered cinnamon, cloves, and coriander seeds in equal parts, and half the same quantity of aniseed and fennel-seed powdered.

TAMARIN, n. *tăm'ă-rĭn* (*Midas*): genus of S. Amer. monkeys, small and beautiful, with short muzzle, prominent forehead, long nails, which, except on the hinder thumbs, are formed like claws, the tail longer than the body, not prehensile, and covered with hair so as to resemble the tail of a squirrel. The SILKY T., or MARAKINA (*M. rosalia*), is the best known: it is of golden yellow color, with fine silky hair, of which it is exceedingly careful, to keep it free from stain. It is often taken to other countries, but is very tender, and seldom lives long. It is very gentle and playful. The hair of the head and neck is elongated, so as to form a wig or mane; but this character appears far more strongly in the LITTLE LION MONKEY (*M. leonina*), which inhabits the e. slope of the Cordilleras, and whose appearance—though it is a very small animal, not many inches long—is an amusing caricature of that of the lion.

TAMARIND, n. *tăm'ă-rĭnd* [Ar. *tamr'ul Hind, lit.*, the date of India— from *tamr*, a dried date—so named as having originally come from the country of the dates], (*Tamarindus Indica*): beautiful tree, of nat. order *Leguminosæ*, sub-order *Cæsalpineæ*, native of the E. Indies, but now generally cultivated in warm climates. Only one species is known (*T. Indica*), a spreading tree, 30 or 40 ft. high, with alternate pinnate leaves, which have 12 to 15 pairs of small leaflets, and fragrant flowers, with three petals, the pods brown and many-seeded, as thick as a man's finger, and about six inches long. The pods are filled with a pleasant, acidulous, sweet, reddish-black pulp. It is brought to America and Europe, mixed with seeds and fibres in a mass resembling jam, from the E. and W. Indies, and the Levant. Tamarinds are preserved usually by pouring hot syrup on the ripe pulp; but a better method is to put alternate layers of tamarinds and sugar in a stone jar, the color and taste being thus more like those of the fresh pulp. The wood of the T. tree, and especially of its roots, is a cabinet wood of much beauty, but so hard that it is wrought with difficulty.—The pods of some other trees of genera allied to *Tamarindus* are filled with a similar pulp, used in the same way; e.g., the T. plum of India (*Dialium Indicum*), and the brown and velvet tamarinds of Sierra Leone, species of *Codarium*.

On chemical analysis, T. pulp is found to contain citric, tartaric, and malic acids; potash, sugar, vegetable jelly, etc. As a salt of copper is a common adulteration, a piece of polished iron (a knife, e.g.) may be plunged into the pulp and left in it for an hour, when, if copper be present, it will be deposited on the iron. T. pulp is refrigerant and gently laxative; and in combination with more active

remedies, is often employed in diseases of children. It is used in India as a cooling article of food; and a kind of sherbet is formed from it; it is also an excellent addition to curries. T. tea is made by infusing tamarinds in boiling water; when cold, it is an agreeable cooling drink in inflammatory or febrile disorders. T. whey is prepared by boiling one ounce of tamarinds with a pint of new milk, and straining: this also is an excellent cooling drink in cases similar to the above.

TAMARISK, n. *tăm'ă-rĭsk* [F. *tamarisc* and *tamaris*—from L. *tamaris'cus, tamarx,* a tamarisk], (*Tamarix*): genus of plants of nat. order *Tamariscineæ,* sometimes called flowering cypress. This order contains more than 20 (reduced from 60) known species, all natives of warmer parts of Europe and Asia, and of Africa; growing generally in arid situations. Some are herbaceous; others are shrubs or small trees, with rod-like branches, scale-like leaves, and small flowers in close spikes or racemes. The calyx has four or five segments; the corolla four or five petals; the stamens are hypogynous, equal in number to the petals, or twice as many; the pistil has three or four styles; the fruit is a one-celled capsule, with numerous hairy seeds. The COMMON T. (*T. Gallica*) grows in sandy places in countries near the Mediterranean and in s. Asia, and has been naturalized in some places on the s. coasts of England: it sometimes attains a height of 30 ft. The twigs seem to possess tonic properties, and their medicinal virtues were formerly in high repute. The ashes of this and some other species of the genus contain much sulphate of soda. A variety yields what is termed Jews' or Tamarisk manna, or Mt. Sinai manna: see MANNA.—The ORIENTAL T. (*T. orientalis* or *articulata*) grows from w. India and westward; it is one of the few trees seen in the Arabian and African deserts, with whose sands it seems to struggle more than any other tree or shrub. Its leafless appearance accords with the surrounding desolation. It is called *atlé* or *ethel,* and its wood is used for fuel and for many economical purposes.—Galls are found on some species in India, chiefly the Oriental T., which yields 50 per cent. of tannin, and are valued for medicinal use and for dyeing.—The GERMAN T. (*Myricaria Germanica*) is an allied plant, yielding a resin; it is a smaller shrub than the COMMON T., and abounds in many parts of Europe and Asia. It was formerly supposed to possess valuable medicinal properties, but these are now little regarded.

TAMATAVE, *tâ-mâ-tâv':* principal port of Madagascar, on the e. coast, lat. 18° 10′ s., long. 49° 28′ e. Its approach is difficult because of numerous narrow channels formed by coral reefs. Except the houses of foreign residents, it is built in the native style. It has a large interior trade; imports sheetings, shoes, salt, rum, and brandy; and exports India-rubber, beef, and hides. Before the war with France, the imports and exports of Madagascar averaged $3,888,000, of which the greater part passed through T. Imports 1890 were $787,465; exports $846,466.—Pop. 3,000.

TAMAULIPAS, *tâ-mow-lē'pâs:* state in the republic of Mexico, formerly known as New Santander; bounded n. by Tex., n.w. by Cohahuila, w. by Nuevo Leon and San Luis Potosi, s. by San Luis Potosi and Vera Cruz, e. by the Gulf of Mexico; length 400 m., average width 130 m.; 30,225 sq. m.; cap. Victoria. The climate on the low sandy coast is hot and unhealthful, but in the interior it is temperate and enjoyable. The soil is fertile and yields good crops of the principal grains and fruits of the temperate and torrid zones; the mineral wealth in iron, silver, and salt is considerable, but poorly developed; horses, mules, cattle, sheep and goats are reared; and there is a large domestic trade, besides important exports through Tampico and Matamoras. Pop. (1879) 140,137; (1895) 203,342; (1900) 218,948.

TAMBOUR, n. *tăm'bĕr* [see TABOUR: F. *tambour;* It. *tamburo,* a drum: Ar. *tabl,* a drum]: small drum: in *arch.,* the naked part of certain capitals, bearing some resemblance to a drum; the wall of a circular temple surrounded with columns, or the circular vertical part of a cupola above and below; a round course of stones in a pillar: in *mil.,* inclosure of stockade work, usually of timber, about 6 ft. high, and loop-holed—for defense of a gateway or road: the T. on the covered way of a fort is the traverse which closes an entrance from the glacis. T. denotes also a frame used by embroiderers, so called from its original drum-like shape; also the rich embroidery worked on it. Pattern-weaving has been brought to resemble T. work so closely that it has largely superseded it: V. to embroider with a tambour. TAM'BOURING, imp. TAM BOURED, pp. *ĕrd.* TAM'BOURINE', n. *-bĕr-ēn',* a kind of drum; a very ancient musical instrument, much used by the Biscayan and Italian peasants at their festivities, and sometimes introduced into orchestral music where the subject of the piece is connected with a people who use it, as the Basques, gypsies, or peasants of the Abruzzi. It is composed of a piece of parchment stretched on top of a broad hoop furnished with little bells, and is sounded by the hand, fingers, or elbow. When sharply struck by the hand, the tambourine has little effect, unless used in numbers. When sounded by gliding the fingers along the parchment, a roll results, in which the bells chiefly are heard; and by rubbing the parchment without quitting it, with the whole weight of the thumb, the instrument gives out a wild, grotesque sound, sometimes appropriate in masquerade scenes.—The name tambourine is given also to a French dance.

TAMBOV, *tăm-bŏv':* government in s.e. Great Russia, bounded e. by the govts. of Penza and Saratov; 25,710 sq. m. The s. districts are hilly; the interior is a somewhat elevated plateau, with gradual slope toward the north. Several lakes are in the n.; and the principal streams are the Tsna, affluent of the Moksha, and the Moksha, itself an affluent of the Oka. The climate, from the exposure to the biting north winds, is colder in winter than in neighboring governments. The soil in the central and s. districts is a rich vegetable mold, and very productive. In

the n., clay predominates, requiring much manure. The chief agricultural products are rye, wheat, buckwheat, oats, hemp, and flax. The larger forests are in the n., and pasture-lands extend mostly along the banks of the rivers. Agriculture and cattle-breeding are principal employments; and some of the breeds of oxen, sheep, and horses are excellent. Cloth, distilled liquors, tallow, and iron are chief manufactures. The products are exported largely by the Tsna and the Moksha to the Oka and Volga. Nonconformity has spread considerably among the people. —Pop. (1889) 2,730,145; (1897) 2,715,453.

TAMBOV': city, cap. of the govt. of T.; on the Tsna, 750 m. s.e. of St. Petersburg, 300 m. from Moscow. It was founded 1636 under Czar Michael Theodorovich, and served as a fortress against Tartar invasion. It is regularly built; and, though the houses are mostly of wood, there are several important institutions, as the college, milit. hospital, etc. T. is the seat of considerable manufacture of cloth and sail-cloth. The chief articles of trade are leather, wool, tallow, and salt beef.—Pop. (1897) 48,134.

TAMBURINI, *tăm-bō-rē'nē*, ANTONIO: 1800, Mar. 28—1876, Nov. 9; b. Faenza, Italy: opera-singer. His voice was a baritone of much sweetness. He sang for several years in the theatre and churches of his native city; made his *début* in opera at Bologna 1818, and at London and Paris 1832; and was an original performer in Bellini's *Puritani*. T. was most popular in *Figaro* and *Don Giovanni*. He retired 1854.

TAME, v. *tām* [Dut. *tam;* Ger. *zahm*, tame: Icel. *tamr*, accustomed to: Gr. *damaein;* L. *domārĕ*, to subdue]: to reduce from a wild to a domestic state; to civilize; to subdue: to reclaim: ADJ. that has lost its native wildness; domestic; mild; gentle; subdued; spiritless; servile; wanting in vigor; dull. TA'MING, imp. TAMED, pp. *tāmd*. TA'MER, n. *-mĕr*, one who tames. TA'MABLE, a. *-mā-bl*, capable of being reclaimed from a wild or savage state. TA'MABLENESS, n. *-bl-nĕs*, the quality of being tamable. TAMENESS, n. *tām'nĕs*, the quality of being tame or gentle; want of spirit; the being without interest or beauty, as a scene. TAME'LESS, a. *-lĕs*, wild; untamable. TAME'LY, ad. *-lĭ*, in a tame manner; meanly; servilely; unresistingly.

TAME ANIMALS, in Law: animals reclaimed from the wild or savage state, and whose owners may be held subject to certain legal liabilities. In these animals there is absolute right of property. If a tame animal is known to be mischievous, its owner who suffers it to be at large is responsible for damage done by the animal. A ferocious domestic animal may be killed with impunity by any one. The owner of such an animal may be indicted for common nuisance. But unless the keeper or owner knows of the existence of a tendency to ferocity in the animal, he is not liable for damages.

TAMERLANE'; see TIMÛR.

TAM'IAS: see GROUND-SQUIRREL.

TAMIL, *tâ-mēl'* (properly *Tamir'*, erroneously *Tamul*; the language and country being erroneously termed by earlier Europeans 'the Malabar'): people, and their country and language, in s. India and n. Ceylon.—The T. language was the earliest cultivated of all the idioms which Bp. Caldwell designates as Dravidian—this term comprising according to him, besides the Tamil, the Telugu; Canarese; Malayâlam, or Malayârma; Tul'u, or Tul'uva; Toda, or Tuda, or Tudava; Kôta, Gônd; and Khond, or Kund, or Ku. The *T. language*, this learned author says in *Comparative Grammar of the Dravidian or South-Indian Family of Languages* (2d ed. London 1875), is spoken throughout the vast plain of the Carnatic, or country below the Ghauts, from Pulicat to Cape Comorin, and from the Ghauts, or central mountain-range of s. India, to the Bay of Bengal. It is spoken also in the s. part of the Travancore country, on the w. side of the Ghauts, from Cape Comorin to the neighborhood of Trivandrum; and in the n. and n.w. parts of Ceylon, where Tamil'ians formed settlements prior to the Christian era, and whence they have gradually thrust out the Singhalese. Throughout Ceylon, the coolies in the coffee plantations are Tamil'ians; the majority of the money-making classes even in Colombo are Tamil'ians; and ere long, the Tamil'ians will have excluded the Singhalese from almost every office of profit and trust in their own island. The majority of the domestic servants of Europeans, and of the camp-followers in every part of the presidency of Madras being T. people, T. is the prevailing language in all military cantonments in s. India, whatever the vernacular language of the district; hence, at Cananore, in the Malayâla country; at Bangalore, in the Canarese country; at Bellary, in the Telugu country; and at Secunderabad, where Hindustani may be considered the vernacular, the language which most frequently meets the ear in the bazaar is the Tamil'. The majority of the *Klings*, or Hindus, found in Pegu, Penang, Singapore, and other places in the further east, are Tamil'ians. . . . Including Tamil'ians resident in military stations and distinct colonies, and the Tamil'ian inhabitants of s. Travancore and n. Ceylon . . . the people who speak the T. language may be estimated at *about ten millions*. Bp. Caldwell says further: 'T. includes two dialects, the classical and the colloquial,' or the ancient and the modern; called respectively the Shen-T. and the Kod'un-T.' (*Comparative Grammar, etc.*) The classical or ancient is the language of poetry and of the ancient inscriptions; it contains fewer words borrowed from the Sanskrit than the colloquial T., and among these chiefly such as express abstract ideas of philosophy, science, religion, and technical terms of the more elegant arts; and in general, it so considerably differs from the colloquial T. that it is almost unintelligible to the unlearned Tamil'ian. Of all the Indian languages T. has the most imperfect alphabet. The latter consists of 12 vowels—viz., *a*, *â*, *i*, *î*, *u*, *û*, *e*, *ê*, *o*, *ô*, *âi*, and *aû*—and of 18 consonants—viz., *k*, *ch*, *t'*, *t*, *p*, *R*, *ng*, *ñ*, *n'*, *n*, *m*, a final *n*, *y*, *r*, *l*, *v*, *r'*,

t'. Compared to the Devanâgarî alphabet of Sanskrit, it is deficient therefore in the vowels *r'i*, *r'î*, and *lr'i*, though it possesses a short *e* and a short *o*, which the Devanâgarî has not; it has but one sound for *k*, *kh*, *g*, *gh;* for *ch*, *chh*, *j*, *jh;* for *t'*, *t'h*, *'d*, *'dh;* for *t*, *th*, *d*, *dh;* and for *p*, *ph*, *b*, *bh*. It lacks, moreover, the Sanskrit aspirate *h*, the Sanskrit sibilants, *s*, *s'*, and *sh*, and Annswa'ra and Visarga. Of combined consonants, which abound in the Devanâgarî alphabet, it admits only the junction of the nasal and the mute, as *n-t*, *n'-t'*, etc.; doubled nasals, as *n-n*, *m-m*, etc.; doubled surds, as *k-k*, *ch-ch*, etc.; also *t'k*, *t'p*, *Rk*. *Rch*, *Rp*, *yy*, *ll*, *vv*, and *nR;* of triple consonants, only *r'nd* and *ynd*. If Sanskrit derivatives, therefore, are Tamil'ized, various devices are used to separate Sanskrit groups of consonants: thus, Sanskrit *pra* becomes T. *pira;* Sanskrit *kr'ishn'a* becomes T. *kirut't'ina-n* or *kit't'ina-n* (*t't'* instead of *sh*).

The history of the T. country and its people is, in its earliest periods, involved in obscurity. From evidence afforded by the language, Dr. Caldwell has drawn a sketch tending to show that the un-Aryanized Tamil'ians had 'kings,' who dwelt in 'fortified houses,' and ruled small 'districts of country;' that they had 'minstrels,' who recited songs at festivals; but that they were without 'hereditary priests,' without 'idols,' and without ideas of 'heaven, hell, soul, or sin;' yet that they acknowledged the existence of God, whom they styled *kô*, or king, and erected to his honor a temple which they called *kô-il*, or God's house. Their chief worship, however, seems to have consisted in bloody sacrifices to the 'devil.' Dr. Caldwell further shows that they were acquainted with the ordinary metals, except tin and zinc, and with the planets known to the ancients, except Mercury and Saturn; that they had medicines, hamlets, towns, ships; and practiced some lower arts, such as cotton-weaving and dyeing, though none of the arts of the higher class, as painting, sculpture, etc.; that they knew no astronomy, and were ignorant of philosophy and grammar. The earliest civilization of the Tamil'ians is traditionally attributed to the influence of successive colonies of Brahmans from Upper India; and the leader of the first colony is said to have been the Rishi (q.v.) or saint *Agastya*, a personage who plays an important part in Brahmanical legends. He is called the first king of the Pândîya kingdom, which was near the s. extremity of the peninsula; and by the majority of orthodox Hindus he is believed to be still alive, though invisible to ordinary eyes. His era is supposed to belong to B.C. 6th c.; though, like all other ancient Hindu dates, this is uncertain. Whether the Vedic worship (see VEDA) was ever known in the T. country, is in doubt; the worship introduced by the Brahmans seems, on the contrary, to have been that based on the incarnation of Vishn'u (q.v.) and S'iva (q.v.), and therefore to belong to an advanced stage of Hinduism. Vaishn'avas, S'a'vas, and S'âktas (see these titles: also India) are the now prevalent sects in the T. country; for the Jainas (q.v.), who flourished in the Pândîya kingdom, probably

from the 8th or 9th. c. to the 12th or 13th after Christ, were finally expelled from it; and only a few adherents of this sect now are found there.

The oldest T. works are, however, those written, or claimed to have been written, by the Jainas; and it is remarkable that at any period of T. literature few Brahmans have contributed to it anything worth preservation. The finest composition which T. possesses is the *KuRal'* of Tiruval'l uvar, 'a work consisting of 1,330 distichs or poetical aphorisms, on almost every subject connected with morals and political economy': Dr. Caldwell holds that it is not later than the 9th c. after Christ. A commentary on this work by Parimelar'agar is the most classical production in T. by a Brahman. Besides the *KuRal'* the following works are said to have received the sanction of the Madura College, which was then probably the most celebrated seat of learning in all Hindustan. Their names are: *Naladiyar, Nanmanikkadikai, Iniyavai Narppatu, Inna Narppatu, Kar Narppatu, Kallavali Narppatu, Tokai, Tirikadukam, Asara Kovai, Pala Moli, Siru Pansa Mulam, Mutu Moli Kanji,* and *Elati.* For a list of other and later T. works, mediæval or modern, embracing the topics of Religion—Prot. theology, Rom. Cath. theology, Hinduism, and books published by Mohammedans—Jurisprudence, Philosophy, Science, Arts, Literature, Philology, Geography and History, Periodicals and Newspapers, see the useful *Classified Catalogue of Tamil'-printed Books with Introductory Notices,* John Murdoch (Madras 1865); and for learned purposes, Bp. Caldwell's invaluable *Comparative Grammar* noted above.

TAMINE, n. *tăm'ĭn,* or TAM'INY, n. *-ĭ-nĭ* [F. *étamine,* bolting-cloth—from L. *stamen,* the fixed threads in a loom]: a thin woolen stuff highly glazed; a strainer or bolter of hair or worsted cloth.

TAM'MANY SOCIETY, THE, or COLUMBIAN ORDER organization named after a Delaware Indian chief and established in New York 1789, May 12, 'to connect in indissoluble bonds of friendship American brethren of known attachment to the political rights of human nature and the liberties of the country.' Its constitution pledged it to the work of conciliating the savage tribes of Indians who were disputing with tomahawk and torch foot by foot the advancing steps of pioneer and settler; and, to express abhorrence of foreign manners and institutions, the soc. adopted Indian terms and customs for its ritual and ceremonies. Its founders had the further object in establishing it of attempting to counteract the effects of what they considered the anti-republican principles of the Society of the Cincinnati. But the latter soc. has held to its original principles and purposes to the present time; while the T. S. has become recognized on every hand as one of the most powerful political machines in the country. Its thorough organization insures to it the control of the democratic party in New York. The headquarters of the T. S. are in Tammany Hall, 14th street, adjoining the Acad. of Music.

TAMMERFORS, *tăm'mĕr-fors':* town in s. Finland, 250 m. (direct line) w.n.w. of St. Petersburg. It is on a rapid which connects two lakes and affords motive power to an extensive cotton-mill employing a large number of hands. There is also a large flax-mill, a fine stocking manufactory, and a paper-mill. Pop. (1883) 15,023.

TAMMUZ, *tăm ŭz,* or THAMMUZ: word occurring once in the Bible—Ezek. viii. 14: 'And, behold, there sat women weeping for Tammuz;' and which seems to have been first an appellative, 'The Tammuz,' and afterward a proper name. Its derivation is as problematic as its meaning. The Vulgate (all the other versions give the word unchanged—thereby confessing the universal ignorance on the subject) has Adonis; and this has been largely accepted as the most credible explanation of this strange name; though the connection between the legends of T. and of Adonis relates really to only one point. If the two legends pertain to the same subject, T. probably means the Phœnician god Adonis (q.v.), whose chief temple and worship was at Byblus, but who at an early period had been introduced into Syria, Cyprus, and Greece, where he was connected with Aphrodite (q.v.). His festivals were expressions partly of joy, partly of mourning. In the latter, the women gave themselves up to a wild and furious grief over the 'lost Adonis,' shaved off their hair, and sacrificed their chastity in his temples. The days of mourning were completed by a solemn burial of an image of the god. This period was followed by a succession of festive and joyful days, in honor of the resurrection of Adonis. The river Adonis (Nahr Ibrahim) (see PHŒNICIA), which once a year 'ran purple to the sea' from the Lebanon, was supposed to be tinged by the blood of the god; and a vessel sent off from Alexandria, and carried by the tide to Byblus (see BYBLOS in Phœnicia), used to inform the mourners by letter that he had been found again. There is no doubt that the different phases of the year, or rather the disappearance and reappearance of the enlivening rays of the sun, and their influence upon all nature (see OSIRIS), were symbolized in these originally poetical, afterward most licentious and fanatical rites. The time of the year at which these feasts were celebrated has been much disputed: probably they took place at the summer solstice; and the designation of a Hebrew month as Tamuz—which falls about our August—seems to favor this opinion.

TAMMY, or TAMIS, n. *tăm'mĭ* [F. *tamis*—from Dut. *tems,* a sieve]: thin worsted stuff, highly glazed; used for ladies' boots, under the name of *Lasting;* it is called also *Durant.* It is used also, undyed, to form sieves for use in cooking, to strain sauces: such a sieve is called Tammy or Tamis.

TAMP, v. *tămp* [a nasalized form of *tap:* Lang. *tapo* clay; *tapio,* tempered clay for wall-building: F. *tampon,* a bung, a stopper; *tamponner,* to bung, to stop]: among *miners,* to fill up a hole bored in a rock for the purpose of blasting it; in *mil.,* to pack the excavation of a mine with clay, etc., after the powder has been deposited, to direct the course of the explosion; to drive in or down by fre-

quent gentle strokes. TAMP'ING, imp.: N. the act or operation of filling a hole bored for blasting; in *mil.*, the act or operation of packing with sand-bags or clay that part of a mine nearest the charge; the material used in tamping (see MINES: BLASTING). TAMPED, pp. *tăṁpt.* TAM'PER, n. *-pĕr*, one who tamps; an instr., generally of iron, used in tamping or in packing the earthy substance around the powder in a bore or mine for blasting. TAMPION, n. *tăm'pĭ-ŏn*, or TOMPION, n. *tŏm'pĭ-ŏn*, wooden plug for closing the mouth of a cannon or mortar to exclude dust and damp; in naval gunnery, wooden bottom for a charge of grape-shot: a stopper, especially for the upper end of an organ-pipe; a stopple.

TAMPA, *tăm'pa:* city, port of entry, and cap. of Hillsborough co., Fla.; on T. Bay, at the mouth of Hillsborough river, and on the Florida Central and Peninsular and the South Florida railroads; 30 m. from the Gulf of Mexico, 100 m. s.-by-e. of Cedar Keys. It has grown rapidly since 1883, when Henry B. Plant began developing its natural advantages. In 1885 he completed the South Florida railroad from Sanford to T.; subsequently established a steamship line from Port Tampa (8 m. s.) to Havana and other ports; and 1891 opened a hotel which cost furnished $2,500,000. T. was made a port of entry 1889, and during the year ending 1903, June 30, imports of merchandise were $2,297,721; exports $1,639,302. There were 120 cigar factories, which produced 132,799,019 cigars in 1899; 2 national banks (cap. $150,000), 1 state bank, 1 incorporated bank (cap. $50,000); and 6 periodicals. T. was a mobilization camp during the Spanish-American war. Pop. (1880) 720; (1890) 5,532; (1900) 15,839.

TAM'PA BAY: largest bay in the Gulf of Mexico, on the w. side of the peninsula of Fla.; called by the Spaniards 'Espiritu Santo;' now divided into Old Tampa Bay and Hillsborough Bay. It is 35–40 m. long, 6–15 m. wide, and 15–20 ft. deep at its bar; and is made a safe harbor by a line of keys which protects it from storms. At the entrance is a brick light-house 86 ft. high.

TAMPAN, *tăm'păn:* a Tick (q.v.) of s. Africa, remarkable for its very poisonous bite; found in Angola and the country southward, and described by Livingstone in his *Travels*. It attacks by preference the parts between the fingers or toes. It attains the size of a pea, and when it has satiated itself with blood is of dark-blue color, and its skin so tough that it cannot be burst by squeezing with the fingers. The first effect of the bite is a mingled sensation of pain and itching, which ascends the limb until it reaches the abdomen, and soon causes either violent vomiting and purging or fever. The tingling sensation lasts for a week.

TAMPER, v. *tăm'pĕr* [a form of TEMPER: probably a metaphor from the *tempering* of clay]: to meddle; to deal with or influence unfairly and secretly; to try little experiments. TAMPERING, imp.: ADJ. trifling; meddling: N. the act of meddling with or influencing secretly. TAM'PERED, pp. *-pĕrd.* TAM'PERER, n. *-pĕr-ĕr*, one who tampers.

TAMPICO, *tăm-pē'kō*, or SANTA ANNA DE TAMAULIPAS: seaport of Mexico, state of Tamaulipas, on the Panuco, 5 m. from its mouth in the Gulf of Mexico. Its streets are broad and regular. It has a custom-house. A breakwater and jetties make the harbor a good one, and ocean vessels enter it. Hides, tallow, bones, and salted meat are exported to the United States and Great Britain. Annual imports amount to about $3,220,000; exports—greatly varying—about one-third to one-half as much.

TAMPION, n.: see under TAMP.

TAM-TAM, n. *tăm'tăm'*, or TOM-TOM, n. *tŏm'tŏm'* [Hind. *tom tom*, imitative of the sound of a drum]: drum flat at one end, and convex or round at the other, resembling a tambourine, but larger, and oval instead of round—used in the E. Indies and w. Africa, made of various materials, and very sonorous. It has been used occasionally in orchestras.

TA'MUS: see BRYONY.

TAMWORTH, *tăm'wĕrth:* municipal borough, partly in Staffordshire, partly in Warwick, England; on the Tame, 7 m. s.e. of Lichfield, 110 m. n.w. of London. Of the ancient church, the transepts are Norman; part of the castle is also very old, the greater part being modern. Brewing, dyeing, wool-stapling, and manufactures of terra cotta, elastic, tapes, and small wares, are carried on. The old castle was long the residence of the Saxon kings. There are several important public institutions. Pop. (1881) 4,891; (1891) 6,614.

TAN, n. *tăn* [F. *tan*, bark of oak: Bret. *tann*, oak: Ger. *tanne*, a fir-tree]: bark of the oak, willow, and other trees, which abounds in tannin, crushed and broken in a mill, used for turning skins into leather (see LEATHER): a yellowish-brown color: ADJ. of yellowish-brown color like tan: V. to convert skins into leather by steeping them among water and the bark of the oak, willow, etc.; to make tawny or brown by exposure to the sun: *familiarly*, to thrash. TAN'NING, imp.: N. process of turning skins or hides into Leather (q.v.). TANNED, pp. *tănd:* ADJ. made brown by exposure to the sun. TANLING, n. *tăn'lĭng*, in OE., one who has been browned by the heat of the sun. TAN'NABLE, a. *-nă-bl*, that may be tanned. TAN'NER, n. *nĕr*, one who tans hides. TAN'NERY, n. *-ĭ*, a place where the operations of tanning are carried on. TANNIN (see below: also TANNIC). TAN-BED, a bed of waste tan. TAN-PICKLE, brine for tanning. TAN-PIT, a vat or pit in which hides are laid among tan. TAN-YARD, a place where the tanning of skins is carried on.

TANAGER, *tăn'a-jėr:* name applied popularly to N. Amer. birds of the genus *Piranga*, family *Tanagridæ*, which may be characterized as finch-like, but with a notch either slight or strong in the upper mandible. The Scarlet T. (*P. rubra*) is scarlet with black wings; the Rose T. or Summer Red-bird (*P. æstiva*) is all rose-red; but the females of both species are yellow and greenish. The Louisian T. (*P. ludoviciana*) of w. N. Amer. is yellow and black, with the head crimson. The Hepatic T. (*P. hepatica*) is named from its liver-color. The genus *Tanagra* and many other genera, including hundreds of species, are new world tropical, and mostly very brilliant in color. *Euphonia elegantissima*, blue, yellow, and black, is found as far n. as the s. w. border of the United States.

TANANARIVO': see ANTANANARIVA.

TANCRED, *tăng'sred*, COMTE DE LECCA: last Norman king of Sicily (reigned 1189-94); illegitimate grandson of King Roger. He succeeded William the Good, son and successor of William the Bad, and though he left the throne to his son, William the third, Emperor Henry, of Germany, conquered Sicily and the Italian provinces, assumed the crown, and at his death (1197) left it to his son.

TANCRED: prince of Sicily, and one of the heroes of the first crusade; 1078-1112, Dec. 6; son of Endes, a Norman baron, and of Emma, sister of Robert Guiscard (see GUISCARD). The first authentic information respecting him is that he raised a large body of men in Apulia and Calabria, and joined his cousin, Bohemond, then on his way to the first crusade. The two cousins landed in Epirus, and first one and then the other made their submissions to the Greek emperor, Alexis. T.'s exploits on the way to Syria; his quarrel with Baldwin for the possession of Tarsus, and his subsequent chivalrous forbearance to, and rescue of, his rival; his wondrous valor before Antioch, where he killed 700 infidels, transmitting the heads of 70 to the pope, and receiving a corresponding number of marks of silver in return; his vigorous repulse of the first sortie by the infidels from Jerusalem; his sad and lonely vigil on the Mount of Olives; and his gallantry at the storming of the sacred city—all are detailed by the numerous chroniclers of this epoch, with their usual extravagant laudation, but with a harmony which indicates the general high estimate of his character. He was one of the claimants of the throne of Jerusalem, and was pacified by Godfrey (q.v.), the successful competitor, with the gift of some towns in Palestine, and the principality of Galilee or Tiberias. A brief quarrel with Baldwin after Godfrey's death, petty combats with the infidels, and occasional wars with the other Christian princes who had settled in Syria and Palestine, occupied the remainder of his life.

TANDEM, ad. *tăn'dĕm* [L. *tandem*, at length, at last]: singly; one before the other—applied to horses harnessed one before another instead of abreast: N. two horses harnessed *tandem* in a light two-wheeled vehicle. Bicycle or tricycle carrying two persons, one behind the other.

TANEY, *taw'nĭ*, ROGER BROOKE, LL.D.: chief-justice of the U. S. supreme court: 1777, Mar. 17—1864, Oct. 12; b. Calvert co., Md. He graduated at Dickinson Coll. 1795; practiced law in his native place and Frederick; was a member of the Md. assembly and senate; and removed to Baltimore 1822. He was appointed atty.gen. of the state 1827, and of the United States 1831 under Pres. Jackson, who transferred him to the secretaryship of the treasury 1834, in which office he removed the U. S. deposits to local banks, his dismissed predecessor having refused so to do. The senate, however, would not confirm his nomination to the treasury, nor in 1835 to a seat as associate justice of the supreme court. In 1836 a Jacksonian majority confirmed his nomination as successor to Chief-Justice Marshall. His name is associated chiefly with his decision in the case of Dred Scott—a slave who gained freedom when removed by his master from Mo. to Ill., and afterward was taken to Wis. Terr., whence he returned to Mo., where, claimed as a slave, he appealed to the courts as having been freed by his master's act. The chief-justice agreed with a majority of his associates that Dred Scott, not being a citizen, had no standing as plaintiff before the U. S. circuit court of Mo.; and further reviewed history to show that negroes had always been regarded as beings 'so far inferior that they had no rights which the white man was bound to respect,' and therefore that they were not of the people who were included in the declaration of independence. This denial of any rights to the negro which the white man is bound (legally) to respect, though agreeing with slave-laws in the southern states, shocked the conscience of the north, and led to the election of Lincoln. T. further held that the limitation of the bounds of slavery in the Missouri Compromise was unconstitutional; and that Dred Scott lost his freedom by removal to Wis. Terr. and to Mo. His subsequent rulings were in keeping with this, and were in conflict with the action of free-state courts and of Pres. Lincoln. He died on the day that Md. abolished slavery.

TANG, n. *tăng* [a metaphor from a ringing sound: F. *tan-tan*, a cattle-bell: Sp. *tangir*, to play on a musical instr.: Maori, *tangi*, cry, sound: Ar. *tanin*, sound, noise]: a rank taste, as of something extraneous; relish; something that leaves a pain; a sound; a tone; a twang: V. in *OE.*, to ring with. TANGING, imp. TANGED, pp. *tăngd*. *Note.*—'*Twang* and *tang* are both used for a loud ringing sound and a strong taste'—Wedgwood.

TANG, n. *tăng* [Icel. *tangi*, a narrow tongue of land: Gael. *teanga*, a tongue]: the part of a knife, fork, or file, or the like, which runs up into the handle; the tongue of a buckle.

TANG, n. *tăng:* sea-weed: see TANGLE 2.

TANGANYIKA, *tăn-găn-yē'kâ:* lake in e. central Africa, between lat. 3° and 9° s.; long. of centre 30° e.; about 600 m. from the e. coast of Africa; length about 420 m.; breadth 15 to 60 m.; longest fresh-water lake in the world; 12,650 sq. m.; about 2,700 ft. above sea-level. It occupies an enormous crevasse, and its depth in some places exceeds 1,000 ft. It is bordered by hills and mountains, some of which rise 5,000 to 10,000 ft.—giving grandeur to its shore scenery. It was discovered by Speke and Burton 1858. Livingstone, Baker, and others who visited it, deemed it connected with the Albert Nyanza, and a feeder of the Nile; but Cameron surveyed the s. and w. coasts 1874, and discovered an outlet, the Lukuga, on the w. side, which was considered to point toward a connection with the Congo. In 1876 Stanley satisfied himself that this channel, which (later) he proved to communicate with the Lualaba or Upper Congo (see CONGO), is generally dried up in certain parts of its course, and carries the overflow of T. westward only at intervals of years. Thomson reaffirmed the connection between T. and the Congo by the Lukuga. Hore, who spent more than two years on the shores of the lake, found the height of the surface 1879, Mar., 2,700 ft. above sea-level; 1880, Aug., he found that the water had fallen 10 ft. 4 in.: he believes that the lake had for several years been rising to the former, apparently its highest level; that the obstructions in the Lukuga had then been carried away, and so the water had again found its way to the Congo. About 120 rivers and streams flow into the T.—the most important, the Malagarasi, near Ujiji. Except when several rainy seasons follow one another, the evaporation keeps the water at about the same level.—See *Proceedings of the Geog. Soc.*, 1882.

TANGENT, n. *tăn'jĕnt* [F. *tangente,* a tangent—from L. *tangens* or *tangen'tem*, touching—from *tango*, I touch]: in *trig.* and *geom.*, straight line which touches a circle or curve, but when produced does not cut it (see TRIGONOMETRY): ADJ. in *trig.* and *geom.*, touching. TAN'GENCE, n. *-jĕns*, or TAN'GENCY, n. *-jĕn-sĭ*, a contact or touching. TANGENTIAL, a. *tăn-jĕn'shăl*, of or relating to tangents; having a tendency, while moving in a curve, to fly off in a straight line. TANGEN'TIALLY, ad. *-lĭ*. TANGENT SCALE, a slip of metal divided into degrees and quarter-degrees, placed to slide in a groove on a gun to enable the person aiming to give the necessary elevation.

TANGHIN, *tăn'gĭn* (*Tanghinia venenifera*, or *Cerbera Tanghin*): tree of nat. order *Apocynaceæ*, native of Madagascar. The fruit is a drupe, of which the kernel is so deadly a poison that, though not larger than an almond, one kernel is sufficient to kill 20 people. It was used in Madagascar as an ordeal for discovery of guilt or innocence, with the general result of the death of those subjected to it. A little of the powdered kernel was placed on the tongue of the suspected person, and he was obliged to swallow it: only those recovered whose stomachs quickly rejected the dose. The progress of Christianity in

Madagascar has led to discontinuance of this ordeal. A similar poison-ordeal is used in parts of Africa. See ORDEAL: ERYTHROPHLÆUM.

TANGIBLE, a. *tăn'jĭ-bl* [F. *tangible*—from L. *tangib'ĭlis*, tangible—from *tango*, I touch: It. *tangibile*]: that may be touched; perceptible by touch; that may be possessed or realized; evident. TAN'GIBLY, ad. *-blĭ*. TAN'GIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of being perceptible to the touch. TAN'GIBLENESS, n. *-bl-nĕs*, the state or quality of being tangible.

TANGIERS, *tăn-jērz'*, or TANGIER, *-jēr'*: seaport of Morocco, on a small bay or inlet of the Straits of Gibraltar, 38 m. s.w. of the town of Gibraltar. The town, on two hills, presents a fine appearance from the sea; but is small and ill-built, the houses—except the residences of foreign officials—being mean, and the streets narrow and dirty. The town is surrounded by old walls, and protected by several forts. The harbor is merely a roadstead, but is the best in Morocco; and there is an extensive shipping-trade—the annual value of entering and clearing cargoes being stated at about $3,000,000.—T. was taken by the Portuguese 1471, ceded to the English 1662, and held by them 22 years.—Pop. estimated about 30,000.

TANGLE, v. *tăng'gl* [probably the same word as TANGLE 2: to *tangle* is 'to keep twisting together like *seaweed*'—Skeat]: to knit together confusedly, as a thread; to interweave so as to make it difficult to unravel; to involve; to complicate; to embarrass; to be entangled; in *OE.*, to ensnare; to trap: N. a quantity of thread or other things confusedly intermingled; perplexity. TAN'GLING, imp. *-glĭng*. TANGLED, pp. *tăng'gld:* ADJ. united confusedly; entangled. TAN'GLY, a. *-glĭ*, knotted; intertwined.

TANGLE, n. *tăng'gl*, or TANG, n. *tăng* [Icel. *thöngull;* Ger. and Dan. *tang*, seaweed]: common name of *Laminaria digitata* and *L. saccharina*, two species of broad-leaved seaweed, natives of British shores, growing on rocks in deep water; called sometimes Oar-weed. The stem is woody; the frond long, ribbon-shaped, leathery, flat, and without midrib. The young stalks are an article of food, as they secrete much gelatinous matter. *L. potatorum*, a large species, supplies the aborigines of Australia with instruments, vessels, and food. TAN'GLY, a. *-glĭ*, covered with the seaweed called tangle.

TANGRAM, n. *tăng'răm:* a Chinese toy, consisting of a square of thin wood or other material cut into seven pieces of different sizes and shapes, with which, by combination, a great variety of figures can be formed.

TANHÄUSER, or TANNHÄUSER, *tăn'hoy-zĕr:* subject of one of the most celebrated German legends of the middle ages; a knight who, in his travels, comes to Venusberg (q.v.), and enters the cave-palace, to behold the wonders of the Lady Venus and her court. After a period there in every kind of delight, his conscience smites him. Invoking the Virgin Mary, he obtains leave of absence, and makes a pilgrimage to Rome, to seek from Pope Ur-

ban, through confession and penance, remission of his sins, and escape from damnation. But the pope, who happens to have a wand in his hand, tells him that he can as little obtain God's mercy as that dry wand can become green again. Thereupon, T. departs in despair, and returns to the Lady Venus in the mountain. Three days afterward, however, the wand begins to sprout and bear green leaves; and the pope immediately sends out messengers to every country, but in vain—T. can nowhere be found. Such is the story, as told in the popular ballad formerly common all over Germany and beyond it, and sung in the district of Eutlibuch as late as 1830—the best version of which is in Uhland's *Alte hoch- und niederdeutschen Volkslieder* (Stuttg. 1845). In the preface of the *Heldenbuch*, it is further added that 'the faithful Eckhart'—a character in German heroic legends—sits before the Venusberg and warns the people of its dangers. In this shape the story may be traced as far back as the 14th c.; but the substance of the legend is much older, dating from the days of German paganism. Some traditions connect it with the Hoselberg or Hörselberg, near Eisenach, in which the Lady Holle or Holda (see BERCHTA) held her court, who, on her part, seems identical with Freyja, the Scandinavian Venus. The peculiar mythological meaning of the saga, which has numerous points of contact with many other German traditions, has, however, never yet been thoroughly searched. Grimm sees in it a touching portrayal of the regret that lingered in the popular heart after the departing paganism, and of the sternness of the Christian priesthood in regard to it. Compare Kornmann, *Mons Veneris* (Fkf. 1614); Grässe, *Die Sage vom Ritter Tannhäuser* (1846; 2d ed. 1861). In later times the saga has been put into poetical form, among others by Tieck, and made use of by R. Wagner in an opera. This idea of subterranean (or subaqueous) palaces in which the king or queen of dwarfs, pygmies, fairies, and such folk, held their court, seems to have been very widely spread. Everywhere stories are told of men being enticed to enter, and finding it difficult or impossible ever again to obtain their liberty: see THOMAS THE RYMOUR. The visit of Ulysses to the isle of Calypso, and that of Circe, appear modifications of the same idea.

About the middle of the 13th c., and contemporary with Pope Urban (Urban IV., 1261–65), there really lived in Germany a Bavarian knight named T., who, as Neidhart relates, after returning from the wars, resided as Minnesinger (q.v.) at the court of the Austrian Duke Frederick II. the Quarrelsome. At the duke's death, and after having wasted his substance in dissipation, he resided partly with Duke Otto II. of Bavaria, and partly led a wandering life. T. composed spirited ballads, which, however, show the decay that had already set in in the Minnesinger's art. T.'s memory was held in high regard by the Meistersingers, who also preserved one of his measures; and it is possible that this T. may have been introduced into popular fiction,

and have had his name worked into a myth, in which there is some resemblance to his actual fortunes; in which process, however, that ancient myth became transformed into the later saga. The poems of T. are published partly in the second part of the *Minnesinger* (pub. by Von der Hagen, Leip. 1838), and partly in vol. VI. of Haupt's *Zeitschrift für deutsches Alterthum* (Leip. 1848).

TA'NIS: town in Egypt: see ZOAN.

TANIS, *tā'nĭs:* Tyrian name of the goddess Astarte (q.v.).

TANIST, n. *tā'nĭst* or *tăn'ĭst* [Gael. *tanaiste*]: formerly the elected chief of an Irish sept or clan. TANISTRY, n. *tā'nĭs-trĭ*, the ancient Celtic custom of succession, generally described as devolving the right to inherit lands or authority on the oldest and worthiest of the blood. The tanist, or righdomna, was heir-apparent of the chieftainship, whom it was the practice to elect during the lifetime of the sovereign; and there is no doubt that the nearest to the original stock had a preferable claim, as contended by Bruce in his claim to the Scottish throne. The practice of electing a successor applied also to inheritance of land and succession to ecclesiastical offices.

TANITE, n. *tā'nīt* [etym. doubt.]: trade-name of a cement of emery and some binding material, used as a compound for grinding wheels, disks, laps, and in other forms.

TANJORE, *tăn-jōr'*, or TANJUR, *-jŏr':* important town of Brit. India, cap. of the dist. of T., presidency of Madras; 180 m. s.s.w. of the city of Madras, in an extensive plain, on one of the branches of the delta of the Cauvery or Kaveri. The town comprises two forts and several suburbs: the forts are so connected as almost to be one. The smaller fort is a parallelogram in shape, 600 yards in extreme length, joined on the n. to the larger, which is circular in shape, and 1,100 yards in greatest diameter. The walls of both are lofty and strong, and surrounded by a ditch cut out of the solid stone. T. presents monuments of early Indian civilization which are of high historical importance. The principal edifices are the Great Temple, dating from the 11th c., esteemed the finest in India (see INDIAN ARCHITECTURE): and the palace of the rajah. Silks, muslins, and cottons are manufactured. Pop. (1901) 57,870.

The *district* of T. is a part of the Southern Carnatic, 3,654 sq. m., coastline 140 m.; known as the garden of s. India: pop. about 3,000,000, of whom 2,500,000 Hindus, 160,000 Mohammedans, 85,000 Christians (largely Rom. Catholics).

TANK, n. *tăngk* [Port. *tanque*, a pond: Scot. *stang* or *stank*, a pool, a pond: OF. *estanc*—from L. *stagnum*, a pool]: a large cistern for storing water and other fluids; a reservoir of water; that part of the tender of a locomotive which contains the water. TANK-ENGINE, an engine without a tender and carrying its own fuel and water.

TANKARD, n. *tăng'kĕrd* [OF. *tanquard;* O. Dut. *tanckaert*, a drinking-vessel]: a large drinking-cup or vessel with a lid, and made of metal.

TANK'WORMS: worms (*Filariæ*) abounding in the mud in Indian tanks. Some of them closely resemble the guinea-worm infesting the human body. Although there is no positive evidence, there is extreme probability that these tank-worms are the origin of the guinea-worm; and that bathing in water infested with these worms produces the infestation of the guinea-worm. The only difficulty in the theory is that the tank-worms are widely diffused, while the guinea-worm is of restricted occurrence.

TANNAHILL, *tăn'a-hĭl*, ROBERT: Scotch poet: 1774-1810, May 17; b. Paisley, where his life was almost entirely passed in the humble occupation of a weaver. Very early his study of the poems of Burns and others developed an ambition to emulate them. His poetry soon gave him local celebrity, which was widened by the publication, 1807, of a collection (*Poems and Songs;* new and larger ed., with memoir, Glasgow, 1838). But while his modest fame was extending itself, his life ended abruptly: he was found drowned in a canal near Paisley—doubtless by suicide. A morbid melancholy had been growing on the quiet and diffident poet, and clouding his life with gloom. As a song-writer, T. is remembered; a few of his best pieces, happily wedded to music, having established themselves in the musical repertory of the Scottish people. He has a genuine lyrical gift, without force and passion, but with grace and sweetness. His best songs are—'Loudon's Bonnie Woods and Braes,' 'Jessie, the Flower of Dunblane,' and 'Gloomy Winter's Noo Awa.'—See Life in Semple's ed. of his Poems (1876).

TANNER, TANNERY, TANNING, TANNED, TANLING, TAN-PICKLE: see TAN: also LEATHER.

TANN'HÄUSER: see TANHÄUSER.

TANNIC, a. *tăn'nĭk* [from TAN]: applied to a peculiar acid found in oak-bark, and more abundantly in gall-nuts, which is very astringent, and has the power of converting the skins of animals into leather. TAN'NATE, n. *-nāt*, a salt of *Tannic Acid* (q.v.). TAN'NIN, n. *-nĭn*, another name for *tannic acid*, the peculiar principle in gall-nuts and oak-bark; a powerful antiseptic or preservative from putrefaction—the same property existing in peat-mosses, derived from the accumulated decay of vegetable substances.

TAN'NIC ACID, or TAN'NIN: synonymous terms, under which chemists include a number of solid non-nitrogenous substances, consisting of carbon, hydrogen, and oxygen—some crystalline, others amorphous—possessing no smell, but a marked astringent taste. They are soluble in water and alcohol, the solutions being acid, and yielding precipitates with most metallic oxides. A solution of gelatine is also precipitated by a solution of any of the tannic acids, and the gelatigenous tissue in raw hides is by an analogous process converted into leather (q.v.: also GALLOTANNIC ACID). None of these acids are volatile;

and when exposed to the action of heat, they decompose, and yield the so-called pyro-acids. The persalts of iron yield bluish-black or green precipitates with the tannic acids.

The members of this group are widely diffused throughout the vegetable kingdom. The bark and leaves of most forest trees, e.g., the oak, the elm, the willow, the horse-chestnut, and the pine—and of many fruit trees, e.g., the pear and plum, contain T. in notable quantity. The wood and bark of many shrubs, e.g., the sumach and whortleberry, and the roots of the tormentilla and bistort, also are powerfully astringent, owing to the presence of one of the forms of T. Coffee and tea, as well as Paraguay tea, likewise contain a modification of this principle. All these bodies, except coffee, precipitate the persalts of iron of bluish-black color; or, if a free acid be present, the solution assumes a dark-green color. The variety of tannin or tannic acid occurring in catechu and kino, produces a green precipitate with the persalts of iron; while that in matricaria, rhatany, and the common nettle, produces a gray precipitate. The principal members of this group are—1. *Gallotannic acid* (q.v.) or *Digallic* or *Tannic acid* (in the ordinary acceptation of the term), obtained mainly from the gall-nut; 2. *Moritannic acid*, or *Maclurin*, obtained from fustic (*Morus tinctoria*); 3. *Quinotannic* or *Cinchonatannic acid*, obtained from cinchona bark; 4. *Quercitannic acid*, from oak bark; 5. *Mimotannic acid*, from catechu; 6. *Kinotannic acid*, from kino; to which some chemists add a variety occurring in coffee and Paraguay tea, to which the term *Caffetannic acid* is given.

TANNOMETER, n. *tăn-ŏm'ĕ-ter* [Eng. *tannin*, and *meter*]: hydrometer for determining the strength of tanning liquor.

TANSY, n. *tăn'zĭ*, TANSIES, n. plu. *tăn'zĭz* [F. *tanaisie;* Port. *atanasia*, the plant tansy—from Gr. *athanasia*, immortality], (*Tanacetum*): genus of plants of nat. order *Compositæ*, allied to *Artemisia* (q.v.); having hemispherical heads of flowers, with florets all tubular, receptacle naked, pappus a slight membranous border. The species are numerous, natives of temperate parts of the old world. COMMON T. (*T. vulgare*), European, grows in fields and by road-sides, river-banks, etc.; and has long been generally cultivated in gardens. It is now naturalized and common in many parts of N. America. It is a perennial, two to four ft. high, with great abundance of deep-green, bipinnatifid, inciso-serrate leaves; flowers in terminal corymbs, yellow, and rather small. The leaves and flowers have strong aromatic smell and bitter taste. The young leaves are used for flavoring puddings, cakes, omelets, etc. The plant is also tonic and anthelmintic; and *tansy tea* is an old popular medicine. Some curious old customs linger in many parts of England connected with the use of *tansy cakes* and *tansy puddings* at Easter, originally in remembrance of the use of bitter herbs at the Paschal feast. In former times, ecclesiastics and laics played at ball in the churches for tansy cake at Easter-tide: the highest digni-

taries took part in this, and began the ball-playing, which went on during the antiphone, and was accompanied with dancing. After the ball-playing, all retired for refreshments; and a gammon of bacon was a standard dish, to signify abhorrence of the Jews. A tansy pudding was an essential part of the feast.—See Chambers's *Book of Days.* —Costmary (*T. balsamita*) is also cultivated in gardens for its fragrance; it was put in ale, and hence called ale-cost and maudlin.

TANT, n. *tănt* [from *taint,* to stain]: a small field-spider of an elegant scarlet color.

TANTALITE—TANTALATE: see TANTALUM.

TANTALIZE, v. *tăn'tă-līz* [L. *Tantălus;* Gr. *Tantălos,* an anc. king, who, having divulged the secrets of Jupiter, was punished in the lower world by having branches laden with fruit hung over his head, which always receded from his grasp, while a rock above threatened to crush him every moment; he was also placed up to the chin in water and yet could not drink]: to tease or torment by presenting some object of pleasure or desire just within reach, to be again placed beyond it; to excite expectations or fears which will not be realized; to tease; vex; irritate; provoke. TAN'TALIZING, imp.: ADJ. irritating or tormenting after the manner in which Tantalus suffered. TAN'TALIZED, pp. *-līzd.* TAN'TALIZER, n. *-lī-zĕr,* one who tantalizes. TAN'-TALIZINGLY, ad. *-lĭ.* TANTALIZATION, n. *tăn'tă-lī-zā'shŭn,* the act of tantalizing; the state of being tantalized. TAN'-TALISM, n. *-lĭzm,* the punishment of Tantalus; a teasing or tormenting.

TANTALUM, *tăn'ta-lŭm* [from *Tantalus* (q.v.)], (symb. Ta, at. wt. 182): metallic element discovered 1803 in two Swedish minerals, tantalite and yttrotantalite. Metallic T. is obtained by heating fluotantalate of potassium with metallic sodium in a close iron crucible, and washing out the soluble salts with water. It is a black powder, which, when heated in air, burns brightly and is converted into tantalic oxide. T. is refractory to all acids, except hydrofluoric (dissolving slowly in warm aqueous hydrofluoric acid) and a mixture of the latter acid with nitric acid; in this it dissolves very rapidly. T. has no economic use. *Tantalite* occurs with beryl, columbite, samarskite, and garnet in N. C., and in decomposed granite in Ala.; it is essentially a tantalate of iron, manganese, etc., as yttrotantalite is a tantalate of yttrium, containing also uranium, calcium, iron, and other metals.

TANTALUS, *tăn'ta-lŭs:* character noted in Greek mythology and legend for his punishment in the lower world. He is said to have been the son of Zeus by Pluto; and some legends describe him as king of Argos or Corinth; others relate that he dwelt in a palace on Mt. Sipylus, and was a guest at the table of the gods. Various reasons are assigned for his severe punishment, the most common being, that he divulged the divine counsels of Zeus, which the latter had communicated to him as secrets. In the lower world, he was afflicted with insatiable thirst, and

had to stand up to the chin in a lake, the waters of which receded from him whenever he tried to drink. Clusters of fruit hung over his head, which the wind wafted from his grasp whenever he sought to pluck them—his mind meanwhile being kept in constant terror lest a huge rock suspended above his head, and ever threatening to fall, should crush him. T., or rather his punishment, has supplied the Eng. language with the verb 'tantalize.' T. was father of Pelops, Broteas, and Niobe.—The tomb of T. on Mt. Sipylus was pointed out in antiquity near Magnesia (q.v.).

TAN'TALUS: genus of birds of family *Ardeidæ*, resembling storks in feet and bill, except that the ridge of the bill is rounded, and its tip gradually curved downward, and slightly notched on each side; a portion of the head, and sometimes of the neck, is bare. The AFRICAN T. (*T. ibis*) was long regarded as the Ibis (q.v.) of the anc. Egyptians; but it is rare in Egypt, and belongs chiefly to Senegal: it is much larger than the true ibis. The AMERICAN T., or WOOD IBIS (*T. loculator*), is as large as a stork, but more slender, white, with black quill and tail feathers, the naked skin of the head and neck black: it is found both in N. and in S. America—in the United States inhabiting chiefly the swampy districts of the south.

TANTALUS CUP, n. *tăn'ta-lŭs:* philosophical toy consisting of a siphon so adapted to a cup that, the short leg being in the cup, the long leg may go down through the bottom of it. The siphon is concealed within the figure of a man, whose chin is on a level with the bend of the siphon. As soon as the water rises to the chin of the image, it begins to subside, so that the figure, like Tantalus in the fable, is unable to quench its thirst.

TANTAMOUNT, a. *tăn'tă-mount* [F. *tant;* L. *tantus*, so much, and Eng. *amount*, which see]: equal; equivalent in value or signification.

TANTIVY, ad. *tăn-tĭv'ĭ* [imitative from the sound of a hunting-horn]: swiftly; speedily—a hunting term: N. a gallop. TO RIDE TANTIVY, to ride at the utmost speed.

TANTRA, n. *tăn'tră* [Skr. *tan*, to believe]: a division of the Hindu sacred books—those of the worshippers of the female energy of the god S'iva: see S'ÂKTAS. A T. is said to comprise five subjects—the creation and destruction of the world, the worship of the gods, the attainment of all objects magical rites for the acquirement of six superhuman faculties, and four modes of union with spirit by meditation. A variety of other subjects, however, are introduced. They all are in the form of dialogue between S'iva and his wife, in which the questions of the goddess are answered—especially, and in full, concerning the *mantras*, or prayers and incantations, under solemn cautions that they involve a great mystery, on no account to be divulged to the profane. The efficacy of these *mantras* is deemed all-powerful; so that, according to some Tantras, faith in these revelations of S'iva frees from the consequences of the most atrocious sins. The followers of the Tantras rank them as a fifth Veda (q.v.), of equal antiquity

and superior authority. Such an antiquity, or one approaching it, is entirely imaginary. Their date is unknown, but there is negative evidence against a date as early as the first centuries of the Christian era.—See H. H. Wilson, *A Sketch of the Religious Sects of the Hindus*, and the works of Barth (1882) and Monier Williams.

TANTRUMS, n. plu. *tăn'trŭmz:* in *familiar language*, childish ill-humor, with fits of passion; a burst of ill-humor.

TANTUM ERGO, *tăn'tŭm ĕr'gō* [L., 'So great therefore']: name of the hymn uniformly sung in the Rom. Cath. Church at benediction with the Holy Sacrament; these words being the first words of the penultimate strophe of the hymn *Pange Lingua*. The *Tantum Ergo* is the most popular of the eucharistic hymns.

TANZIMAT, or TANSIMAT, n. *tăn'zĭ-măt* [plu. of Ar. *tansim*, a regulation]: the organic laws established by the Hatti Sherif of Gulhane, in accordance with which the administration of the Turkish empire is carried on. These organic laws, the first attempt at constitutional government in Turkey, were published by Sultan Abdul-Medjid 1844; and treat of—(1) the political organization of the empire, and the powers and jurisdiction of the chief officials and higher courts; (2) administration and finance; (3) justice; (4) military affairs. But the T. was a dead letter, or nearly so, except in connection with the army; so that 1854, Sep. 7, the sultan found it necessary to publish a new ordinance, commanding the complete carrying out of the T.; for securing which a commission was appointed.

TAOISM, or TAOUISM, n *tā'ō-ĭzm* [Chin. *taou*, the way]: one of the three great religions of China, whose doctrines constitute a transcendental and speculative rather than a practical system; founded by the Chinese sage *Lao-tsze*, (q.v.: see also CHINA): the other two systems are *Confucianism* and *Buddhism*. TA'OIST, or TA'OUIST, n. *-ĭst*, believer in Taoism.

TAORMINA, *towr-mē'nâ* (anc. *Tauromenium*): town on the e. coast of Sicily, province of Messina, on a narrow ledge of rock, 900 ft. above the sea, about 30 m. s.w. of Messina. It consists mainly of a single street, more than a mile in length; is surrounded by a Saracenic wall; has numerous convents and churches, many picturesque palaces and mansions built in the middle ages, and numerous relics of antiquity, among which are fine sepulchres, an aqueduct, tessellated pavements, remains of a 'Naumachia' and of a theatre: the last reckoned one of the most splendid ruins in Sicily, and commanding a view of a magnificence scarcely paralleled in the world. T. has trade in wine and hemp. Pop. about 3,000.

Ancient *Tauromenium* was built at unknown date after the destruction of Sicilian Naxos B.C. 403: it rapidly attained prosperity.

TAOS, *tâ'ōs* (properly FERNANDEZ DE TAOS): village, cap. of Taos co., N. M.; 10 m. e. of Grande river, 65 m. n.e. of Santa Fé. It is in an agricultural and wool-growing region, has 4 churches, 1 private bank, and 1 weekly newspaper, and is noted for its hot springs and its Indian pueblo remains. The 'North Pueblo of T.' is interesting from its extent and the unusual crowding together of its separate dwellings or cells.—Pop. (1880) about 350; (1890) 978; (1900) 1,225.

TAP, v. *tăp* [F. *tape*, to tap: Low Ger. *tappen*, to grope, to fumble: Bohem. *tepati*, to strike with a hammer]: to strike with something small; to strike a gentle blow; to pat; to touch lightly: N. a gentle blow; a slight stroke. TAP'PING, imp. TAPPED, pp. *tăpt*.

TAP, v. *tăp* [Low Ger. *tappe;* Ger. *zapfen;* Dut. *tap*, a plug thrust in to stop a hole: Sw. *tapp*, a tap, handful, wisp]: to pierce or broach, as a cask, and to insert a tap; to bore into: to pierce for letting out a fluid, as in surgery (see TAPPING): N. pipe with a handle through which liquor is drawn; plug or spill for stopping a hole pierced in a cask; *familiarly*, the liquor; place in a public-house or tavern where liquor is drawn for drinking; a conical screw made of hardened steel, and grooved, for cutting internal threads in nuts and the like. TAP'PING, imp.: N. act of opening a cask of liquor by the insertion of a tap: surgical operation of removing fluid from the body, as in the disease of dropsy (see below). TAPPED, pp. *tăpt*. TAPSTER, n. *tăp'stĕr*, one whose business is to draw liquor from the cask. TAP-BOLT, a bolt with a head on one end and a thread on the other. TAP-HOUSE, house where liquors are retailed. TAP-ROOM, or THE TAP, common drinking-room of a public-house. TAP-ROOT, in *bot.*, main root of a plant, which descends deeply in a tapering undivided manner. ON TAP, with a tap in the barrel, and so ready to be drawn, as ale *on tap*. TO TAP TELEGRAPH WIRES, to intercept intelligence in course of transmission by telegraph.

Tap-root.

TAPAJOS, *tâ-pâ'zhōs:* important river of Brazil, an affluent of the Amazon; formed by confluence of the Arinos and the Juruena, both rising in the s. of the province of Matto Grosso. After a northward course more than 1,100 m. in length, the T. falls into the Amazon, about 20 m. below the town of Santarem. In lat. about 7° 30′ s., it has a fall of 30 ft.; but the interruptions to the navigation, which is said to reach to within a short distance of its source, are few. A portage of only 18 m. separates the upper waters of the T. from those of the Paraguay.

TAPE, n. *tāp* [AS. *tæppe,* a tape, fillet—perhaps from Gr. (see TAPESTRY)]: a narrow band of cotton or linen cloth, used for strings, etc. TAPE-LINE, a narrow band of linen cloth painted, and figured with inches, varying in length from six feet, much used by builders, engineers, etc., in measurements. TAPEWORM, a long flat worm like a tape, bred in the intestines of vertebrate animals; the tænia (see below). TAPEISM, n. *tāp'ĭzm,* or RED-TAPEISM, formal routine; routine, as in a government office, carried to excess, often resulting in vexatious delay—so called from the *red tape* employed in tying up papers and documents.

TAPE-GRASS (*Vallisneria*): genus of the Frog's-bit family (*Hydrocharidaceæ*); called also Eel-grass; but that name might well be confined to the salt-water *Zostera* of the family *Naidaceæ,* with similar leaves, but with flowers in two rows on a linear spadix. In Tape-grass the staminate clusters of buds, else confined to the bottom of the water, break away and float to the surface, where they open and fertilize the pistillate flowers, which are raised to the surface on thread-like scapes that afterward coil spirally, pulling the fruit under water to ripen. *V. spiralis* is common in slow waters in this country and Europe. Its linear, ribbon-like leaves, obscurely serrate, are used under the microscope to show the wonderful rotation of protoplasm in the vegetal cell.

TAPER, n. *tā'pĕr* [AS. *taper,* a wax-light: Ir. *tapar;* W. *tampr,* a taper: comp. Skr. *tapas,* fire]: a small wax-candle; a long wick coated with wax: ADJ. regularly narrowed toward one end; long and slender, like a wax *taper:* V. to narrow to a point; to become gradually smaller toward the end. TA'PERING, imp.: ADJ. gradually terminating in a point. TA'PERED, pp. *-pĕrd.* TA'PERINGLY, ad. *-lĭ.*

TAPESTRY, n. *tăp'ĕs-trĭ* [F. *tapisserie,* tapestry—from *tapis,* a carpet—from mid. L. *tapēcĭus,* tapestry—from L. *tapētĕ,* hangings for covering walls—from Gr. *tapēs,* a carpet, woolen rug]: kind of decorative carpet-work, used for hangings to the walls of rooms, coverings for furniture, and for thrones, chairs of state, etc.; dyed of various colors, and embroidered; called also *arras:* V. to adorn with tapestry, or as if with it. TAP'ESTRYING, imp. TAP'ESTRIED, pp. *-trĭd:* ADJ. adorned as if with tapestry. TAPESTRY CARPET, sort of Brussels carpet in which the warp is so printed beforehand as to produce a figure or design in the completed fabric.—*Tapestry* has been in use from very ancient times; but concerning the art of working it we have little information until the time of the Saracens, who revived it, and brought it into notice. They used T. probably only as drapery or curtains for the courts of their houses: its use as covering for walls seems to have been an invention of the Flemings previous to 1606, at which date it was introduced into France by Henry IV., who engaged Flemish artists to teach the art of it. At that period, so generally was its origin attributed to the Saracens that it was called

Sarrazinois. The oldest piece in existence is that described under the name of the BAYEUX T. (q.v.). At first the Saracenic tapestries were ornamented only with flowers and geometric figures; but the Flemings aimed higher, and sought to enrich them with historic subjects of the highest order; and so important did this art become, that the most eminent masters in painting, from Raphael downward, bestowed their greatest efforts on cartoons to serve as copies for the T.-workers, of which the celebrated Raphael cartoons, formerly at Hampton Court, now in a gallery specially designed for them in the Kensington Museum, are illustrations (see CARTOON). After its introduction into France by Henry IV. at the beginning of the 17th c., the art of making T. does not appear to have made much progress until the middle of that century, when a small establishment founded by the brothers Canaye on the premises formerly occupied by Jean Gobelin, a dyer of wool, was commenced, and was afterward carried on by a Dutchman named Gluck and his assistants with such success that it was suggested by Colbert, minister of Louis XIV., that it should be taken under the king's patronage; in consequence of which the establishment was bought, and constituted a royal manufactory 1667, under the management of Lebrun. A royal carpet manufactory had been established 1615; this was called La Savonnerie, from the previous use of the buildings for manufacture of soap. The Savonnerie and the Gobelins were both carried on with great spirit by successive sovereigns, and were formed into one establishment 1826, when the works of the Savonnerie were removed to the Gobelins, where the work is now brought to great perfection; also at a minor establishment at Beauvais, dept. of Oise, where it is worked in a different style. At the Gobelins, a series of threads are arranged vertically in a frame like the warp of a loom, and the workman stands behind the frame, the pattern being placed behind him for reference. To produce the design, he has a number of wooden needles threaded with wool and silk of the colors required, and these are passed through the upright warp-threads, and brought back, so that each thread becomes covered with the necessary color; and such is the extreme nicety with which this is done, and such the delicacy and multiplicity of the shades of color employed, that little difference can be detected between the T. picture and the painting from which it was copied. At Beauvais, the warp is placed horizontally, and the workman stands over it; this renders it necessary to cut off the ends on the upper surface, which is avoided in the other plan of working from behind. The Beauvais is, however, a style intermediate between T. and carpet-work, and the roughness of surface so produced has a good effect. The modern works of the Gobelins were distributed as presents by the late imperial govt. of France. They are not produced in great numbers, and are of great money value. The number of artists employed is about 120.

TAPETUM, n. *tă-pē'tŭm* [L. *tapētĕ*, a carpet]: in *anat.*, a silvery layer lining a greater or less extent of the back part of the choroid membrane of the eye, in fishes and many mammals.

TAPE'WORM: term properly used in a vague sense to designate any worm of the group *Cestoidea* (see CESTOID WORMS). According to Dr. Cobbold, more than 250 distinct forms of cestoid worms have been described, of which probably somewhat less than 200 may be regarded as really distinct species. These he divides into the three families: (1) *Tæniadæ*, or true tapeworms; (2) *Bothriocephalidæ;* (3) *Tetrarhynchidæ*. For natural history of the tapeworms generally, see CESTOID WORMS. It is to be noted, in preliminary, that every T. passes through several distinct phases during its life-history. 'In the ordinary colonial or T. condition,' says Dr. Cobbold in his work *Entozoa*, 'it has been termed the *strobila* (Van Beneden). The separate joints of which the strobila is composed are denominated *proglottides*, or zooids. The anterior segment forms the *head*, and remains barren, those of the neck and front part of the body being sexually immature during the process of strobile formation. The mature proglottides at the caudal end are capable of realizing an independent existence, and the eggs which they contain develop the six-hooked embryos, or *proscolices* (Van Beneden), in their interior. These latter become metamorphosed into *scolices* or nurses, representing the well-known cysticercal state, which, in its sterile or aborted condition, forms the common *hydatid*.' During the greater part of their existence, the tapeworms are parasitic animals, the mature proglottides and eggs being free during only a comparatively short interval. They are mostly restricted in distribution to the vertebrate animals, comparatively few of the invertebrates (except the cuttle-fish) appearing to harbor them in their adult condition, though the T. larvæ, nurses, or *scolices* probably abound in various invertebrate groups. In the human body, no less than 9 species occur—viz., 6 *true tapeworms* and 3 species of *Bothriocephalus;* and as 4 distinct species have been found in the Barbary ape, it is obvious that errors of diet, due to civilization, are not the cause of these parasites. Among the animals with which we are most familiar, the species are plentiful in the common dog (and in true carnivora generally), in rats and mice. The typical ruminants are almost constantly infested both by mature and by immature forms; while the larger pachyderms, and solidungulates (horse, ass, etc.), harbor only a few adult forms; but only larvæ appear to be known in swine. These worms appear to be as abundant in granivorous birds as in carnivorous hawks, owls, etc. In the water-birds generally, the adult worms are very abundant, their larvæ existing in the food of such birds, in fishes, mollusks, etc. In reptiles these worms are extremely rare, though other parasitic worms abound; while in fishes they are very abundant both in the adult and in the larval forms.

The *Tæniadæ*, or *true tapeworms*, may be distinguished

from the other families of the order *Cestoidea* (cestoids or tapeworms in the popular sense) 'by the possession of a small distinct head, furnished with four simple oval or round suctorial disks (suckers), and commonly also with a more or less strongly pronounced rostellum (proboscis) placed at the summit in the median line. This prominence, when largely developed, becomes retractile, and when not in use is lodged within a flask-shaped cavity lined by a sheath and supplied with special muscles; it is also very frequently armed with a single or double crown of horny chitinous hooks, there being occasionally as many as five or six separate circular rows of these organs. Attention to the number, relative size, and disposition of the hooks is often sufficient to determine the particular species. In nearly all cases, the reproductive orifices are situated at or near the margins of the joints which are bisexual.'—Cobbold, *Entozoa*. The 6 true tapeworms occurring in man are: (1) *Tænia solium;* (2) *Tænia saginata* (or *mediocanellata*); (3) *Tænia nana;* (4) *Tænia flavopunctata;* (5) *Tænia madagascarensis;* (6) *Tænia cucumerina*. All of these occur in the adult condition in man, as do also the 3 species of bothriocephalus, *B. latus*, *B. cristatus*, *B. cordatus*. But there are four species of *Tænia* which infest the human body in their larval state—viz., *Tænia solium* (larva, *Cysticercus cellulosæ*), *Tænia acanthotrias* (larva, *Cysticercus acanthotrias*), *Tænia marginata* (larva, *Cysticercus tenuicollis*), *Tænia echinococcus* (larva, *Echinococcus*).

The *common tapeworm*, *Tænia solium*, derives its Linnæan title from the idea that it is always a solitary worm; but though this is usually, it is not always the case. The full-grown T. (strobila) has been known from earliest times, and is described by Hippocrates, Aristotle, and Pliny; but its organization and mode of development have been properly understood only in recent years. The segments of which it is composed vary in size, and number 800 to 1,000, the earlier immature ones being extremely narrow, and the sexually mature joints commencing at about the 450th segment. From 10 to 35 ft. may be regarded as representing its ordinary length; its breadth at about the widest part being one-third of an inch. The head—seldom seen in the tapeworms exhibited in museums, though the evacuation of the head with the rest of the worm is not very rare—is very small and globular (about the size of a pin's head), with black pigment ingrained in it. Under low magnifying power, it shows four circular sucking disks, in front of which is a conical proboscis, armed with a double crown of hooks, 22 to 28 in each circular row. The head is succeeded by a very narrow neck, nearly half an inch in length, which is continued into the anterior or sexually immature

Fig. 1.
The double crown of hooks more highly magnified.

part of the body, in which traces of segmentation appear first in the form of fine transverse lines, which are gradually replaced by visible joints. These joints or segments represent the body, and each mature segment contains both male and female organs of generation; and in addition to these structures, the entire series of joints is traversed by a set of vascular canals constituting the so-called aquiferous system, which consists of two main channels, one passing down either side of the worm, and both connected by transverse vessels which occur singly at one end of every joint. It is only in the alimentary canal of man or some other animal that a T. of any kind can attain sexual maturity; and in all of these the eggs are fecundated before being discharged. The expulsion of the eggs may take place in any of the following ways: First, the mature segments separate from each other, and passing out of the body, either with the ordinary evacuation of the bowels or independently, become decomposed, and set free the inclosed eggs. The single joints thus discharged undergo violent contraction after being expelled, which led to their being formerly mistaken for a distinct species of worm, to which the title *Vermes cucurbitini* was applied, from their resemblance to a pumpkin-seed. Secondly, the eggs may be discharged through the genital pore by pressure from any cause. It is only thus that we can account for the occasional (but very rare) co-existence of a *Cysticercus cellulosæ* (the larva of *Tænia solium*) and an adult T. in the intestinal canal of the human subject—an association which constitutes one of the most serious dangers which the matured worm can inflict upon its host, and one of the strongest indications for its removal. Thirdly, the mature joints sometimes appear to undergo disintegration within the intestine, and to liberate the eggs; but the conditions under which this disintegration occurs are unknown. They are usually expelled from the human bowel at the rate of six or eight a day. Their vitality is prolonged by moisture, which favors distribution of the liberated eggs over grass and other vegetables, or in water, which may be used as food or drink by animals. The eggs, in their mature condition, present a globular figure, and are easily recognized by their remarkably thick shell, which surrounds the six-hooked embryo. They present an average diameter of $\frac{1}{694}$ of an inch, the shell itself measuring about $\frac{1}{4000}$ of an inch in thickness. After a while, by accident, as it were, a pig coming in the way of these embryos, or of the proglottides, is liable to swallow them with matters taken in as food. The embryos, immediately on being transferred to the digestive canal of the pig, escape from the egg-shells, and bore their way through the living tissues of the animal, and, having lodged themselves in the fatty parts of the flesh, they there rest to await their further transformations or destiny. The animal thus infected becomes 'measled,' its flesh constituting the so-called measly pork. In this situation, the embryos drop their hooks, and become transformed into the *Cysticercus cellulosæ*. A portion of this measled meat

being eaten by man, either raw or imperfectly cooked, transfers the cysticercus to the human alimentary canal, in which locality the cysticercus attaches itself to the wall of the intestine, and, having secured anchorage, begins to grow at the lower or caudal extremity, producing numerous joints or buds to form the strobila or tapeworm colony.

In the article GENERATIONS, ALTERNATION OF, it was stated that the group of phenomena included in that term would be further illustrated in the history of the tapeworm. From what has been above shown, it appears that we have a simple alternation of generation in which the immediate product of the proglottis (or sexually matured zooid individual) is a six-hooked brood; by metamorphosis, the latter becomes transformed into the cysticercus, having a head with four suckers and a double crown of hooks; and by gemmation, the latter gives rise to a whole colony (strobila) of individuals, the greater part of which are destined to become sexually mature—zooid individuals or proglottides. It will be observed, therefore, that the product of a single ovum is, in the first instance, a single non-sexual embryo; in the second phase, it becomes a non-sexal cysticercus (these two phases together constituting the protozooid); in the third change, it gives off, by budding, numerous gemmules, most of them destined to be sexually mature individuals (or deuterozooids), in this way resembling their original parents. The relation and nature of these developmental changes may be further simplified by placing the various life phases in a tabulated form as follows:

(*a*) Egg in all stages.
(*b*) Six-hooked embryo = proscolex. } Protozooid.
(*c*) Resting larvæ, or *Cysticercus cellulosæ* (scolex).
(*d*) Immature tapeworm.
(*e*) Strobila, or sexually mature *Tænia solium*.
(*f*) Proglottis (cucurbitinus) = free segment = deuterozooid.

The common T. may cause disease, and even death, by its aggressions, either in its adult or in its larval stage of existence. A mature T. in the intestinal canal may give rise to a series of anomalous symptoms, including 'vertigo, noises in the ears, impairment of sight, itching of the nose and anus, salivation, dyspepsia, and loss of appetite, colic, pains over the epigastrium and in different parts of the abdomen, palpitation, syncope, the sensation of weight in the abdomen, pains and lassitude in the limbs, and emaciation.'—Davaine, *Traité des Entozoaires, etc.* Many cases are on record in which hysterical fits, chorea, epilepsy, convulsions of various kinds, and even mania, have been induced by the irritation excited by this parasite, and have ceased at once on its removal. But distressing as these symptomatic phenomena may be, their injurious effects are trifling as compared with the troubles which follow the deposition and growth of the larval form within the body, especially when the cysticerci find a home in the more important vital organs. There are at least a hundred cases on record in which the cysticercus has caused death by its development within the human brain. In the present state of our knowledge, it is impossible to diagnose

these cases; and even if a correct diagnosis were possible, nothing could be done in treatment. Epilepsy, with or without mania or imbecility, is commonly but not invariably present in these cases. 'Cysticerci,' says Dr. Cobbold, 'may develop themselves in almost any situation in the human body, but they occur most frequently in the subcutaneous, areolar, and intermuscular connective tissue; next, most commonly in the brain and eye; and lastly, in the substance of the heart and other viscera of the trunk.' The *adult form of the worm* enters the system as the cysticercus of measly pork; and to eat raw or underdone measly pork is an almost certain means of introducing this parasite into the body. It is satisfactory to know that the temperature of boiling water is sufficient to destroy the vitality of the measles; and that in ordinary salted pork, and in hams, they are destroyed by action of the salt in one case, and of the combined salt and smoke in the other Sausages, into which measly pork may find its way, are rendered safe if they are cooked till no pink, raw-like, fleshy look can be seen in their centre. The *larval worm* may gain access into the human body by the mature eggs of the T. being swallowed. Those who, as students of this department of natural history, handle fresh tapeworms, are perhaps especially liable to this misfortune; but edible parts of vegetables eaten uncooked, fallen fruits, etc., and drinking-water, near human habitations or where night-soil has been used as manure, may convey the eggs to the stomach.

The T. next in importance to *Tænia solium* is *Tænia saginata* or *mediocanellata*, which was established as a distinct species first by Küchenmeister. It exceeds the *Tænia solium* both as regards length and breadth, and the thickness of the individual segments; also the head is somewhat larger, abruptly truncated at the crown, destitute of proboscis and hook apparatus—hence this species has been described as the *hookless tapeworm*—but furnished with very large sucking-disks, surrounded by much dark pigment, which gives the head a blackish appearance. Leuckart has proved by experiment that the measles or cysticerci which produced this worm are found in the muscles and internal organs of cattle. He administered proglottides of *T. saginata* to three calves, a sheep, and a pig. In the two last-named animals they produced no effect, as was shown by their post-mortem examination; while in the calves they produced a kind of leprosy, since characterized as 'acute cestoid tuberculosis,' and which proved fatal if too large a dose of eggs had been administered. On

Fig. 2.
Head of *Tænia mediocanellata*, magnified about 35 diameters.
(From Cobbold.)

examining one of these animals after its restoration to health—48 days after the eggs were swallowed—he found numerous cysticercus-vesicles, larger and more opalescent than those of the pig, lodged within the muscles; and as the heads of the contained cysticerci exhibited the distinctive peculiarities presented by the head of the adult worm, 'we are supplied with the most unequivocal evidence that man becomes infested with this second form of T. by eating imperfectly cooked veal and beef.' Until Küchenmeister established the species *Tænia mediocanellata* (*saginata*), the two above-described species were commonly included under *Tænia solium*, from lack of due examination, especially of the head.

The other species of man-infesting tapeworms are not of frequent occurrence. Of the species which infest man in their larval state, *Tænia echinococcus* is probably more fatally injurious to the human race than all the other species of entozoa together. In its mature (strobila) condition, in which it is found in only the dog and the wolf, it seldom exceeds a fourth of an inch in length, and develops only four segments, including that of the head. The final segment, when sexually mature, equals in length the three anterior ones, and contains as many as 5,000 eggs. The proscolex or embryo forms large proliferous vesicles, in which the scolices or larvæ (known also as acephalocysts, echinococci, echinococcus heads or vesicles, pill-box hydatids, etc.) are developed by gemmation internally. The eggs develop in their interior a six-hooked embryo, and 'these embryos are introduced into human bodies with food or water into which the eggs have been carried. 'With an especial liking for the liver,' says Dr. Cobbold, 'they bore their way into this organ or are carried along the circulating current to other organs. In these situations, they sooner or later become transformed into simple vesicular, bladder-like bodies, commonly called acephalocysts or hydatids.' Instead, however, of displaying the head, neck, and body of a cysticercus, the vesicle retains a globular figure. Its growth is slow, and many months elapse before echinococci are developed within the body after swallowing the proper T. eggs and their contained embryos. Of 373 cases of the echinococcus parasite occurring in man, collected by Davaine (who devotes more than one-third of his *Traité des Entozoaires* to this subject), 165 affected

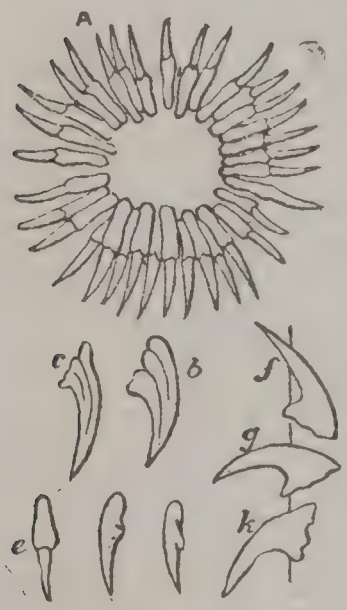


Fig. 3.

A, magnified view of the circle of hooklets, seen upon its under surface, thirty-four in number; *b*, *c*, lateral views of the separate hooklets; *e*, hooklets seen on the inferior or concave border; *f*, *g*, *k*, illustrate the movements and position of the hooklets, the vertical line running through the fixed point of each of the three hooks.

the liver, 40 the lungs, 30 the kidneys, 20 the brain, and 17 the bones, while the remainder were spread over other parts; and of 136 cases collected by Cobbold, 51 affected the liver, of which last (51) less than 35 cases recovered.—For an excellent abstract of the remarkable series of experiments by which the relationship between the so-called cystic worms and the cestoid worms was established, see Aitken's *Science and Practice of Medicine*, I.; while for the subject of T. generally, the highest authorities are the works of Küchenmeister and Siebold, translated by the Sydenham Soc.; Davaine's *Traité des Entozoaires;* Weinland's *Essay on the Tapeworms of Man;* Cobbold's *Entozoa;* and Leuckart's *The Parasites of Man* (Eng. transl. 1886).

For the means of expelling tapeworms when they have found lodgment in the human intestinal canal, see VERMIFUGE. Though rare among horses and cattle, tapeworms are common in dogs and sheep, causing irritability of the bowels and an unthrifty appearance. For dogs, no other remedy is equal to powdered areca-nut, of which 30 grains suffice for a dog weighing about 20 lbs. It is best given after 10 or 12 hours' fasting, in a little soup or milk; and should be followed in a few hours by a dose of castor-oil. Neither areca-nut nor any of the approved remedies used in man proves effectual in sheep; and one of the best prescriptions for them consists of 40 drops of oil of turpentine, a dram of powdered green vitriol, and an ounce of common salt, given mixed in a little milk or gruel, or, where their bowels are confined, in linseed-oil. A daily allowance of linseed-cake and sound dry food should likewise be given with the grass or roots, and pieces of rock-salt left within the animal's reach.

TAPIOCA, n. *tăp'ĭ-ō'kă* [Brazil. *tipioka*, the juice of the manioc root when pressed]: farinaceous starchy substance, in the form of coarse grains, obtained from the cassava or manioc plant, the *Janipha manihot*, or bitter cassava, ord. *Euphorbiăcĕæ*, native of Brazil—*cassava* or *manioc* is prepared from the same, but is more finely granular: see MANIOC, or CASSAVA.

TAPIR, n. *tā'pĕr* [Brazil. *tapy'ra*, a tapir], (*Tapirus*): genus of *Pachydermata*, of section *Ordinaria;* having a bulky form, with moderately long legs; fore-feet four-toed, hind feet three-toed; skin thick, hair short; tail very small; the neck thick; ears short; eyes small; muzzle elongated; nose prolonged into a short, flexible proboscis, which, however, does not terminate in an organ of touch and prehension like that of the elephant; six incisors, two canine teeth, and 14 molars in each jaw, the molars separated from the canine teeth by a wide interval. The best-known species is the AMERICAN T. (*T. Americanus*), about the size of a small ass, and common in almost all parts of S. America, its range extending as far s. as the Strait of Magellan, though it suddenly ceases to be found at the Isthmus of Darien. Its color is uniform deep brown, but the young are beautifully marked with yellowish fawn-colored stripes and spots. The skin of the neck forms a thick rounded

crest on the nape, with a short mane of stiff hair. The T. inhabits deep recesses of the forest, and delights in plunging and swimming in water. It feeds chiefly on young shoots of trees, fruits, and other vegetable substances; but is ready to swallow almost anything. Pieces of wood, clay, and pebbles are often found in its stomach. It sometimes commits great ravages in cultivated grounds; a large herd of tapirs, sallying forth from the forest by night, trampling and devouring all that they find in the fields. The T. is a very powerful animal, and, protected by its thick hide, forces its way through the forest where almost no other quadruped can. When assailed by the jaguar, it seeks riddance by rushing through thick underwood, and, if it can reach water, is often successful by plunging in

Malayan Tapir (*Tapirus Malayanus*) and Young.

and diving. It is inoffensive, never attacking man; but when hard pressed by dogs, makes violent resistance, and inflicts severe bites. It is very easily tamed, and becomes extremely familiar; but its large size makes it a troublesome pet. Its hide is useful, and its flesh is eaten, though rather dry.—The MALAYAN T. (*T. Malayanus* or *Indicus*) is found in Malacca, Sumatra, etc. It is larger than the American T., and its proboscis is rather longer in proportion. The neck has no mane. The color is glossy black, except the back, rump, and sides of the belly, which are white. The colors do not pass gradually one into another, but the line of separation is marked, giving the animal a peculiar appearance. The habits of this species are similar to those of the American T., and it is equally capable of domestication. The young are striped and spotted as in that species.—A third species is found in mountainous parts of S. America.

The remains of tapirs have been found in Miocene and subsequent strata. In all, about 12 species have been determined. Tapir-like animals are common in Eocene beds. Ten species of *Palæotherium* (q.v.) have been described. *Lophiodon*, of which 15 species have been observed, differs from *Palæotherium* in the structure of the teeth of the lower jaw; and from other peculiarities in the same organs,

Coryphodon (containing three species) has been separated from both genera.

The T. is a remarkable exception to the generalization deduced from comparison of the later Tertiary mammals with those living in the same districts at the present day—viz., that there is a close correspondence between the fauna of the two periods. The Phocene and Post-pliocene bears, hyenas, tigers, elephants, etc., of Europe and Asia are represented by living species of the same or nearly allied genera. The recent sloths, armadillos, and prehensile-tailed monkeys of S. America were preceded by closely related forms in the later Tertiary period; as were also the marsupials of Australia. Several species of T, have been found in Europe, but they have left no representatives nearer than e. Asia and S. America.

TAPIS, n. *tá-pē'* [F. *tapis*, a carpet (see TAPESTRY: comp. Gael. *tap*, tow or wool on the distaff]: tapestry; a carpet; a table-cloth. ON THE TAPIS, *tá-pē'*, on the carpet or cover of the council-table; under discussion or consideration: see CARD 1.

TAPPAN, *tăp'an*, ARTHUR: philanthropist: 1786, May 22—1865, July 23; b. Northampton, Mass.; nephew of David T., D.D. (1752–1803), who was Hollis prof. of divinity at Harvard. After experience in business at Baltimore and at Portland, Me., he became a prosperous dry-goods importer in New York, with his brother Lewis. He gave largely to benevolent societies, and to Oberlin, and to Lane and Auburn theol. seminaries; founded the *Journal of Commerce* 1828; the *Emancipator* 1833; the New York Anti-Slavery Soc. 1833; and was pres. of the Amer. Anti-Slavery Soc., to which he gave many thousands of dollars; and so prominent was he as an abolitionist that he was honored by mobbing, and by a heavy reward offered for his abduction. He was conspicuous in aiding the slave-ship mutineer Martin Cinque, who with his companions was educated with reference to founding the Mendi mission in Africa; also in befriending Garrison when imprisoned in Baltimore. The financial disasters of 1837 led to his bankruptcy, after which he became interested in the first 'mercantile agency,' established by his brother Lewis. He died in New Haven, Conn., and his name is perpetuated in educational halls and professorships named from him as founder, as well as in the history of a great moral contest.

TAPPAN, HENRY PHILIP, D.D., LL.D.: educator and psychologist: 1805, Apr. 23—1881, Nov. 15; b. Rhinebeck, N. Y. He graduated at Union Coll. 1825, and Auburn Theol. Seminary 1827; was pastor of a Dutch Ref. church in Schenectady, N. Y., and of a Congl. church in Pittsfield, Mass.; prof. of moral philos. in New York Univ. 1832–38; conducted a select school; and was chancellor of Michigan Univ. 1852–63, after which he was in Europe. He died in Switzerland. He was honored by membership in foreign learned societies, and was prominent in Amer. educational movements, studying carefully the higher education abroad. The following volumes were published by him: *Review of Edwards on the Freedom of the Will* (1839); *The*

Doctrine of the Will determined by an Appeal to Conscience (1840); *The Doctrine of the Will applied to Moral Agency and Responsibility* (1841); *Elements of Logic* (1844); *Treatise on University Education* (1851); *A Step from the New World to the Old, and Back Again* (1852); *Introduction to Illustrious Personages of the Nineteenth Century* (1853).

TAP'PAN, Lewis: philanthropist: 1788, May 23—1873, June 21; b. Northampton, Mass.; brother of Arthur T. Before he united in forming the firm of Arthur Tappan & Co., New York, he was engaged in manufacturing in New England. He participated with his brother in founding the *Journal of Commerce* and other enterprises; and was alike eminent in the anti-slavery movement, suffering personal violence for his zeal, and in 1834 an attack by a mob on his house, with destruction of its contents. Besides originating the first mercantile agency in New York, he led in founding the Amer. Missionary Assoc., of which he was president. He was prominent in establishing and supporting Plymouth Church, Brooklyn. A life of his brother Arthur was published by him. He died in Brooklyn.

TAP'PAN BAY, or Tap'pan Sea (Dutch *Tappaan Zee*): a widening of the Hudson river between Rockland and Westchester cos., N. Y.; 24 m. n. of New York. It is 12 m. long, from Teller's Point on the n. to Piermont on the s.; and 4 m. wide at its widest point.

TAPPET, n. *tăp'pĕt* [from *tap*, a gentle blow]: in *mech.*, a small lever or projection intended to *tap* or touch lightly something else with a view to change or regulate motion.

TAP'PING, in Surgery: operation performed most frequently on the abdomen, but occasionally on the chest and head. T. of the abdomen gives great relief when the abdomen becomes inconveniently distended with fluid contained in the peritoneal sac, or (in the case of a woman) in an ovarian cyst. A small incision is made about two inches below the navel, through which the cutting surfaces of the trochar—the instrument (like a long needle with a fine tube) used in this operation—are passed: through this instrument the fluid escapes. The wound made by the trochar in the abdomen, in ordinary cases, heals in a few days.

T. of the chest is occasionally required for relief of empyema and other effusions in the cavity of the pleura. T. of the head has been occasionally found successful in hydrocephalus. T. of the pericardium has been tried in cases of pericardial dropsy, but it is an operation not to be recommended under any circumstances.

TAP-ROOT, TAPSTER: see under Tap 2.

TAPTI, *tăp'tē:* river of the Brit. presidency of Bombay, India; rising in the Saugur and Nerbuddah territories, lat. about 21° 46′ n., flowing w. through Scindhia's dominions and the districts of Candeish and Surat to its mouth in the Gulf of Cambay, 17 m. below the town of Surat. It is 441 m. in length, but is hardly navigable; as small vessels of 40 to 50 tons cannot ascend higher than Surat.

TAPU, *tä-pō*: see TABOO.

TAR, n. *târ* [AS. *teoru;* Icel. *tjara;* Ger. *theer;* Gael. *tearr*, tar]: thick, impure, resinous substance, of blackish color, obtained from pine and fir trees, and from common coal (see below): familiar name for a sailor—so called from the tar or its odor adhering to his hands and clothing: V. to smear or daub with tar. TAR'RING, imp. TARRED, pp. *târd*. TARRY, a. *târ'rĭ*, consisting of or like tar. COAL-TAR, a viscid fluid found in the pipes during the distillation of gas from coal. MINERAL-TAR, a variety of bitumen found oozing from rocks of different formations. TARRED WITH THE SAME STICK, all alike to blame, or disreputable, as if daubed with tar; having the same bad characteristics. TARRED AND FEATHERED, descriptive of a violent punishment or outrage by a mob—consisting in first covering the victim with tar, and afterward shaking feathers over him, which adhere tenaciously.

TAR, v. *târ* [O. Dut. *tergen;* Ger. *zergen;* Low Ger. *targen* or *tarren*, to irritate, to provoke: Dan. *tærge*, to tease]: in *OE.*, to set on; to provoke; to tease. TAR'RING, imp. TARRED, pp. *târd*.

TAR: one of the products of destructive distillation of organic bodies: it is derived from all three kingdoms of nature. In various parts of the world, it occurs as a natural mineral product, known as bitumen, asphalt, petroleum, natural tar: see NAPHTHA: PETROLEUM: ETC. As an animal product, a species of tar is obtained from destructive distillation of bones used in preparing bone-black. The distillate, which has a most offensive odor, separates into a heavier layer of black animal tar—commonly known as *bone-oil*, or *Dippel's Animal Oil*—and a lighter layer of watery solution of sesquicarbonate of ammonia—commonly known as *bone-liquor*, and much employed in preparation of various salts of ammonia. This animal tar is used chiefly for lubrication of machinery.

The vegetable kingdom is the most important source of tar. On submitting wood to destructive distillation in closed vessels, we obtain a large number of products (see WOOD, DISTILLATION OF); some are gaseous and some liquid, and of the latter one portion is soluble and the other insoluble in water. This insoluble portion constitutes wood-tar, and is composed of a mixture of various liquids holding solid matters in solution or in suspension. Among its most important constituents are several forms of hydrocarbon; e.g., phenol, C_6H_5OH; cresol, $(C_6H_4.CH_3)OH$; phlorol $(C_6H_4.OH)C_2H_5$; pyrocatechine, $(C_6H_4)OH_2$; and many other bodies not yet determined. The *Archangel T.*, the *Stockholm T.*, widely used in ship-building, and the excellent *American T.* are chiefly prepared from the resinous wood of the pine, especially of the root. The specific gravity of ordinary tar is about 1·040. Peat yields, a tar very similar to wood-tar. Coal yields, on distillation in closed vessels, even a larger number of products of distillation than wood. In addition to numerous gaseous products, the liquid portions contain water and various forms of hydrocarbon, which collectively form the liquid known as *coal-*

naphtha; besides which there is a large quantity of dark viscous matter known as *coal-tar*. For the mixture of naphtha and tar, see GAS-TAR. For the beautiful *coal-tar colors* or aniline dyes, see ANILINE: DYE-STUFFS: PHENYL. The distillation of coal-tar is a separate branch of trade. The substance itself is an extremely complex mixture of hydrocarbons, phenols, and nitrogenous bases with various sulphur compounds. Of the substances contained in it, some are basic, and some acid, but the principal portion are neutral or indifferent bodies. The bases include ammonia, aniline, picoline, quinoline, and pyridine. Among the acids, the acetic is present in small amount; but the most important is phenic or carbolic acid. Two other acids, *rosolic* and *brunolic*, exist in coal-T. The neutral substances contain several hydrocarbons, including benzol, toluol, cumol, and cymol, which are among the liquid constituents; while napthalin, anthracene, chrysene, and pyrene are among those which are solid at ordinary temperature (see *Miller's Organic Chemistry*). When wood-tar or coal-tar is submitted to distillation, the solid brown or black residue left in the retort constitutes *pitch*.

Wood-tar, under the title *Pix liquida*, is included in the Pharmacopœia, in which its characters are given as follows: 'Thick, viscid, brownish black, of well-known peculiar aromatic odor. Water agitated with it acquires a pale-brown color, sharp empyreumatic taste, and acid reaction.' Tar was used in medicine in former times more than at present. Bp. Berkeley's commendatory essay on the use of tar-water in diseases of the chest and kidneys, is well-known (see Chambers's *Book of Days*, I. 108). Since his time the inhalation of tar-vapor has been highly recommended in phthisis; and tar-capsules are still occasionally prescribed for relaxed mucous membrane. In the present day, however, tar is seldom used except as a local stimulant in chronic cutaneous diseases.

In modern commerce, there are two kinds of wood-tar —that made in n. Europe from the wood of *Pinus Sylvestris;* and the N. Amer., from *Pinus rigida*, *P. tæda*, *P. Australis*, etc. The distillation is usually performed in a very rude manner: a funnel-shaped hole is dug in a bank, about 6 or 8 ft. in diameter at the upper part, and not more than 18 inches at the lower. At the bottom of the hole is placed an iron pan, having a long spout or pipe, which is made to pass through the bank; the hole is then filled up with billets cut from the roots and branches of the pine-trees, which, after being kindled at the top, are covered over incompletely with turf. The wood is thus charred from above downward; and the tar, mixed with various other products, flows off at the bottom through the spout into a receiver. A somewhat similar product is obtained in distillation of coal for gas, and in distillation of bones for animal charcoal. Formerly, the chief value of these materials was as a preservative coating for exposed wood-work, ships' sails, ropes, etc., in consequence of their very highly antiseptic properties. A better knowledge of their chemical history has increased their value.

TARA, *tä'rä*, or TA'RO, *-rō* (*Colocasia macrorhiza*): plant of nat. order *Araceæ*, of the same genus with the Cocco (q.v.), or Eddoes, and cultivated for its roots, a principal food in the South Sea Islands. The roots are 12 to 16 inches long and as much in girth. They are washed to take away their acridity, which is such as to cause excoriation of the mouth and palate. They are cooked in the same way as bread-fruit, the rind being first scraped off. A pleasant flour is made of Tara. Many varieties are cultivated. The plant has no stalk; broad, heart-shaped leaves spring from the root; and the flower is produced in a spathe. The leaves are used as spinach.

TA'RA FERN (*Pteris esculenta*): species of Brake (q.v.), the root (rhizome) of which was one of the principal articles of food of the New Zealanders, before the settlement of New Zealand by British colonists. This fern comes to perfection only in good soils, and there the plant is 10 ft. high. Plants three years old furnish the best roots, about an inch in circumference. The root, being dug up, is cut in pieces about 9 inches long, and placed in stacks, carefully protected from rain; it is the better for being a year above ground. For use, it is steeped in water, dried in the sun, and then roasted. A large quantity of a pleasant flour is obtained from it by beating on a stone.

TARANAKI, *tä-rä-nä'kē:* provincial dist. of New Zealand, occupying the s.w. corner of the n. island; 2,137,000 acres, three-fourths dense forest. The coast is lined with iron-sand. The soil and climate are good for rearing cattle, horses, and sheep. Cap. New Plymouth; pop. (1890) 3,350.—Pop. of T. (1881) 14,858; (1901) 37,885.

TARANTELLA, n. *ta-răn-tĕl'lä* [It.]: rapid Neapolitan dance in six-eight measure; so called because it was popularly thought to be a remedy against the supposed poisonous bite of the tarantula spider, which was said to set people dancing: also the music suited for the dance.

TARANTISM, *tăr'ant-ĭzm*, or TARENTISM [from It. *Tarento:* see TARANTULA]: a leaping or dancing mania, supposed to originate in an animal poison. The name is from that of the wolf-spider of s. Italy, *Tarantula* (q.v.); and the nervous affection was formerly believed to be produced by the Tarantula's bite. The gesticulations, contortions, and cries somewhat resembled those observed in St. Vitus's Dance, and other epidemic nervous diseases of the middle ages, with which T. was contemporaneous; but the affection differed from these in its origin, in the cachexia present, in the elegance of the movements of the victims, in their partiality for red colors, bright and luminous surfaces, their passion for music, and in their restoration depending on the use of instrumental or vocal music as a remedy. Although the sufferers were subjected to extraordinary treatment, such as being buried up to the neck in earth, the curative effect of music was generally recognized. The class of tunes called *Tarantella* or *Tarentella*, recall the epidemic dancing mania of the middle ages. T. was most prevalent in Apulia, hence the former

specific name of the tarantula, *Tarantula Apuliæ*. Whatever share in the disorder the bite may have had, it is unquestionable that the sufferers were afflicted with some not then recognized nervous malady. The symptoms are plainly those of hypochondriacal and hysterical affections. Modern experiments do not confirm the mediæval belief that T. is produced by the bite of the Tarantula: see TARANTULA. The whole history of the dancing mania is given in Hecker's *Epidemics of the Middle Ages*.

TARANTO, *tä'rän-tō* (anc. *Tarentum*): town of s. Italy, province of Lecce, on a rocky islet, formerly an isthmus between the Mare Piccolo (Little Sea), an extensive harbor on the e. or landward side of the town, and the Mare Grande (Great Sea), or Gulf of Taranto, on the w. The natural channel between the two 'seas' has been spanned by a long bridge of seven arches, rendering the Mare Piccolo quite useless as a harbor, and forcing ships to anchor in the outer roads, exposed to s. and s.w. winds. The principal buildings are a cathedral dedicated to St. Cataldo, native of Raphoe in Ireland, who was first bishop of T.; a fine episcopal palace; a castle and fortifications erected by Charles V., and commanding both seas; and two hospitals. The streets are as narrow and dark as those of an oriental city. T. has manufactures of velvets, linens, and cottons, but little commerce. The Mare Piccolo, however, is still famous (as of yore) for immense abundance of shell-fish, and a considerable portion of the population is supported by the oyster and mussel fisheries. Pop. (1881) 26,611.

Ancient Tarentum was far more famous and splendid than its modern representative. Founded by a body of Spartan emigrants about B.C. 708, it prospered for centuries in happy obscurity. Its territory was not very fertile, but its pasturage was of the finest, and its olive groves were unsurpassed. It attained rank as the chief city of Magna Græcia through the excellence of its harbor (the Mare Piccolo), ample and secure beyond all other harbors of Lower Italy. Gradually it became the chief emporium of the Græco-Italian trade, and long after all the rest of the colonial cities in Magna Græcia had fallen into decay, Tarentum was 'blooming alone' in undiminished prosperity. In B.C. 4th c., it had for its *strategos*, or general (seven times), the philosopher and geometer Archytas, under whom it became the headquarters of the Pythagorean sect, and was honored with a visit from Plato, who was the guest of Archytas during his residence there. But at the acme of its greatness, it provoked a quarrel with Rome (q.v.), B.C. 281, in which, though aided by Pyrrhus (q.v.), King of Epirus, it was utterly crushed, after a struggle of less than ten years; and though its natural advantages prevented its sinking into such insignificance as other cities of Magna Græcia, it was never afterward a place of importance. Under the empire, it was quite overshadowed by Brundusium, on the Adriatic, but rose again during the Gothic wars, and passed into the hands of the Saracens and Greeks, from the latter of whom it was wrested by Robert Guiscard, the Norman, 1063. Since then, it has shared the

fortunes of the kingdom of Naples. Few relics of the classic Tarentum are extant, the chief being bits of an amphitheatre, a circus, and traces of some of the temples.

TARANTULA, n. *tăr-ăn'tū-lă*, or TARENTULA, n. *tăr-ĕn'tū-lă* [It. *tarantola*—It. dim. from L. *Tarentum* (now *Taranto*), town in s. Italy where it is said to be specially common]: species of wolf-spider found in warmer parts of Italy and s. Europe, whose bite has been said to produce an uncontrollable impulse to dance. The name is given also to a violent Italian dance, and to the music to which it is danced.

The T. of s. Europe (*Lycosa tarantula*) belongs to the mining section of the family *Lycosidæ* or wolf-spiders. It is about ¾ in. long, and is covered all over its body with an ochreous down. It is found usually in dry situations thinly covered with vegetation and fully exposed to the sun's rays. It lives in an underground passage which it excavates for itself and lines with its web. The passage is tubiform, an inch in diameter, and descends for a few inches, then bends at an obtuse angle, and becomes vertical again near the closed end. The T. takes its position at the first bend, where it lies in wait for its prey. Sometimes the tube is continued above ground, the T. constructing, of earth and bits of wood, a small funnel, which it lines with web as it does the subterranean tunnel. From a study, by Dr. Zangrelli, of the T. and its habits and of the effects of its bite, it appears that the first pathognomic symptom following the bite is a numbness at the part bitten: after some hours there are slight convulsive shiverings, cramps of the muscles, and spasm of the throat, followed by vomiting and a 3 days' fever. As a rule, recovery follows after a copious perspiration: a fatal result is exceedingly rare, but Dr. Zangrelli records one case in which tetanus was followed by death on the 4th day. The female T. lays about 1,000 eggs in a season: she cares for her offspring until they are able to care for themselves: see TARANTISM.—The name T. is commonly given in America to any large hairy spider, as the bird-spider, crab-spider, and to all spiders of the family *Mygalidæ* (see MYGALE). A genus of spider-like scorpions also bears the name.

TARAPACA, *tâ-râ-pâ-kâ':* till 1883, southernmost dept. of Peru, but annexed by Chili after the war; more than 15,000 sq. m. It contains vast fields of nitrate of soda.—Pop. (1891) est. 47,313.

TARARE, *tâ-râr':* thriving and important manufacturing town of France, dept. of Rhone; at the foot of Mt. T., one of the highest summits of the Beaujolais range, 21 m. n.w. of Lyon. It manufactures fine muslins, cloth, silk, and merino fabrics, to a value exceeding $3,000,000 annually: see TARLATAN.—Pop. (1881) 11,848; (1891) 12,387.

TARASCON, *tâ-râs-kōng':* town of France, dept. of Bouches-du-Rhone; on the left bank of the Rhone, 13 m. s.w. of Avignon by railway, 156 m. s. of Lyon. The church of St. Martha dates from 1187. Woolen and silk fabrics, brandy and vinegar, are manufactured. Pop. (1891) 9,263.

TARAXACIN, n. *tăr-ăks'ă-sĭn* [Pers. *tarashaqún,* dandelion or wild succory]: a bitter crystalline principle obtained from the dandelion. TARAXACUM, n. *tăr-ăks'ă-kŭm,* genus of plants comprising the *Dandelion* (q.v.). *Taraxacum* or *Dandelion Root* is used in medicine. The roots should be gathered in Aug. and Sep., when the juice is most abundant. There is no very satisfactory analysis of this juice; but it is said to contain mannite, resin, sugar, gum, caoutchouc, and a crystallizable matter termed *taraxacin,* on which probably its active properties depend. In extract, decoction, or juice, it may be given with advantage in chronic diseases of the liver, and in some forms of dyspepsia and skin-disease accompanied by derangement of the biliary organs. In very large doses, it has diuretic and slightly aperient action.

TARAXIS, n. *ta-răks'ĭs* [Gr.—from *tarassō, taraxō,* I confound]: slight inflammation of the eye.

TARAZONA, *tâ-râ-thō'nâ:* town of Spain, province of Zaragoza, 52 m. w.n.w. of the city of Zaragoza, on the Queyles, a tributary of the Ebro. It stands on a plain, exposed to bleak winds from the Sierra de Moncayo on the s., and from the Pyrenees on the n. It is the see of a bishop; and contains a cathedral with slender brick spire and rich interior, a bishop's palace, and a Moorish *Alcazar.* Pop. more than 8,000, mainly agricultural.

T. is the ancient *Turiaso;* and here a few Roman troops routed a Celtiberian army. It became a municipium under the Romans; and under the Goths, by whom it was fostered, it became famous for its steel.

TARBAGATAI, *târ-bâ-gâ-tī':* frontier town of Chinese Turkestan, 170 m. e. of the e. extremity of Lake Balkash, lat. 46° 44′ n., long. 82° 28′ e. It stands at the foot of the mountains of T., in a plain watered by the Imil, and with extensive meadows and pasture-grounds in the vicinity. Its trade with Russia is important. Pop. 3,000 exiled Chinese, 1,000 of a Chinese garrison, and a number of Mongolian merchants.

TARBES, *târb:* town in s. France, cap. of the dept. Hautes-Pyrénées; on the left bank of the Adour, 23 m. e.s.e. of Pau. It is a station on the *Chemin de fer du Midi,* and the centre of communication with all parts of the Pyrenees, whose lofty line bounds the prospect on the south. The modern cathedral is the only notable building. There is here a *haras,* or govt. stud, for improvement of the breed of horses. T. has active general trade. Pop. (1886) 24,882; (1891) 25,087.

T. dates from the time of the Romans; and its bishopric was founded 420.

TARBOOSH, or TARBUSCH, n. *târ-bôsh'* [Ar.]: red woolen skull-cap, usually ornamented with a blue-silk tassel—worn by Egyptians, Turks, and Arabs; a fez.

TARDIGRA'DA: see SLOTH.

TARDIGRADE, n. *târ'dĭ-grād* [L. *tardus*, slow; *gradus*, a step]: a term applied to an order or class of Arachnida, often called bear-animalcules, water-bears; also formerly applied to the sloths among mammals: ADJ. slow-paced.

TARDINESS, TARDILY: see under TARDY.

TARDO, ad. *târ'dō* [It.—from L. *tardus*, slow]: in *music*, slowly.

TARDY, a. *târ'dĭ* [L. *tardus*, slow: Sp. and It. *tardo:* F. *tardif*, slow]: slow in motion; sluggish; backward; reluctant; late; in *OE.*, unwary, criminal: V. in *OE.*, to delay; to hinder. TAR'DYING, imp. TAR'DIED, pp. *-dĭd.* TAR'DILY, ad *-lĭ*, slowly. TAR'DINESS, n. *-nĕs*, slowness of motion or pace; reluctance; lateness.—SYN. of 'tardy, a.': slow; sluggish; unwilling; dilatory; late; tedious.

TARE, n. *tär* [F. *tare*, waste or impairment of merchandise—from Sp. *tara*, tare—from Ar. *taraha*, to reject, to deduct]: formerly, among merchants, an allowance, usually of 4 lbs. to every 100 lbs., for the weight of a package, i.e., of a box, cask, wrapping, etc., containing goods: V. to ascertain the allowance for the weight of the package. TAR'ING, imp. TARED, pp. *tärd.* TARE AND TRET, in *arith.*, rule for calculating amount of allowance for tare, tret, cloff, etc. (see TRET). *Note.*—All these modes of allowance have passed out of use.

TARE, n. *tär* [OE. *tare*, eager, brisk: AS. *teran*, to tear], (*Ervum*): genus of plants of nat. order *Leguminosæ*, sub-order *Papilionaceæ*, distinguished from *Vicia* (see VETCH), to which it is nearly allied, by a capitate stigma, downy all over. It contains only a few species of weak climbing plants, natives of temperate parts of the eastern hemisphere. One of these is the LENTIL (q.v.).—Two (*E. hirsutum* and *E. tetraspermum*), generally known by the name of TARE, have very small flowers and pods; the leaves are pinnate, and the leaflets small. They afford nourishing food for cattle, but the quantity is so small that they are not worthy of cultivation, and are chiefly known as a nuisance in corn-fields. A species of T. (*E. sativum*), with an upright branching habit, is cultivated in parts of Europe for its herbage, as food for cattle, though the bulk of herbage is small. The leaves have 8 to 14 pairs of leaflets. The plant thrives well in poor sandy soils.—It is not supposed that the *Tare* of the New Testament has any affinity to these plants: it is doubtful what it is, but it probably is the DARNEL (q.v.).

TARENTULA: see TARANTULA.

TARENTUM, *ta-rĕn'tŭm:* borough in Allegheny co., Penn.; on Allegheny river, and the Pennsylvania and the Allegheny Valley railroads; 20 m. n.e. of Pittsburgh. It is in an agricultural region; has several natural-gas wells; and contains 5 churches, graded schools, 1 national bank (cap. $50,000); also a glass factory, 2 salt-works, and 2 weekly newspapers. Pop. (1880) 1,245; (1890) 4,700.

TAREN'TUM: ancient town in s. Italy; now TARANTO (q.v.).

TARGET, n. *târ'gĕt* [F. *targe;* It. *targa;* Sp. *tarja;* Gael. *targaid,* a shield: comp. L. *tergus,* skin, hide]: Shield (q.v.) or buckler of a small kind: shield-like object set up as a mark for practice for rifle-shooting, or for artillery (see below). TARGE, n. *târj*, in *OE.* and *poetically,* a shield. TARGETED, pp. *târ'gĕt-ĕd,* furnished or armed with a target. TARGETEER, n. *târ'gĕt-ēr'*, one carrying a target.—*Target,* in the modern sense, is the mark for aiming at in practicing with the cannon, rifle, or bow and arrow, etc. Of modern targets, the simplest is that used for Archery (q.v.). For rifle targets, the necessities are: a butt, artificially constructed or cut in the face of a hill, to prevent wide balls from scattering; a marker's shot-proof cell, near the targets; and a range of such length as can be procured.

In the United States, target-ranges for milit. rifle-practice are maintained at a number of regular army posts and by several states. There is an army gunnery school at Fortress Monroe, and a proving ground for heavy ordnance at Sandy Hook. The principal rifle-range in the United States is the one at Creedmoor, Long Island, N. Y., which was provided by the joint action of the National Rifle Assoc., the state of N. Y., and the cities of New York and Brooklyn. Each regt. in the N. Y. militia stationed in the two cities is obliged to practice at the range annually, and in recent years companies of U. S. troops have been sent there for like purpose. The international rifle matches in the United States have been shot there. The range occupies 85 acres of level ground, has 30 targets, which can be used at 50–1,200 yards, and was opened 1873, June 21. The targets are iron slabs, 6 ft. high and 2 ft. wide, and constructed so that several can be bolted together. For ranges 50–300 yards, single targets are used; for 300–500 yards, 3 targets are bolted together (6 x 6 ft.); for 600–1,200 yards and for volley-firing, 6 targets are bolted (6 x 12 ft.). The bull's-eyes are: for 50–300 yards, 8 in. sq. with 2 ft. centres; for 300–500 yards, 2 ft. sq. with 4 ft. centres; for 600–1,200 yards, 3 ft. sq. with 6 ft. centres; and for 400-yard volley-firing, 2 ft. high, bull's-eye extending across the target, with centre 1 ft. above and below bull's-eye; and outer, the remainder of the target.—Shots in the 'outer' make no score.

A 'running-man target' has been devised, which consists of a mill-board figure running on wires, worked by the marker in the butt.

TARGOWITZ, *târ-gō-wĭtz'*, or TARGOWICZA: a small town in the govt. Kiev, Russia; scene (1792, May) of a plot by five Polish nobles adverse to the constitution of 1791, May 3 (see POLAND). They were incited to this by Catharine II., and escaped death only by precipitate flight to Russia, where they were munificently rewarded.

TARGUM, n. *tär'gŭm* [Chald. *targum*, interpretation]: one of the ancient translations or paraphrases of portions of the Old Test. in the Chaldee language or dialect. TARGUM'IC, a. *-ĭk*, pert. to the literature of the Targums. TAR'GUMIST, n. *-gŭm-ĭst*, the writer of a Targum.—*Targum* is the general term for the Aramaic versions of the Old Test., which became necessary when, after and perhaps during the Babylonian exile, Hebrew began to die out as the popular language, and was supplanted by 'Chaldee,' an idiom, or rather a family of idioms; for which see SEMITIC LANGUAGES.

The origin of the T. itself is shrouded in mystery. The first signs of it—as an already fixed institution—have been found by some in the book of Nehemiah, and according to tradition, Ezra and his coadjutors were its original founders. However this be, there can be no doubt that its beginnings belong to a comparatively early period. The Mishna (q.v.) contains a number of strict injunctions respecting it, and also respecting a certain guild of Meturgemans (whence dragoman) or interpreters, who had sprung up as professional followers of those learned men who, at a previous period, had volunteered their services in the translation and paraphrastic interpretation—both these activities being implied by the term. At first, indeed for many centuries, the T. was not committed to writing, for the same reason that the 'Oral Law' itself was not at first intended to become fixed as a code for all times. In the course of time, however, both had to yield to circumstances: and their being written down was considered preferable to their being utterly forgotten, of which there was danger. Yet a small portion only of the immense mass of oral Targums that must have been produced has survived. All that is now extant are three distinct Targums on the Pentateuch, a Targum on the Prophets, Targums on the Hagiographa, viz., Psalms, Job, Proverbs, the five 'Megilloth' (Song of Songs, Ruth, Lamentations, Esther, Ecclesiastes), two Targums on Esther, one on Chronicles, one on Daniel, and one on the apocryphal pieces of Esther. The most important of the three Pentateuch Targums is the one named after Onkelos (q.v.), prob. a corruption of Akylas, whose Greek version had become so popular that this Chaldee version was honored with being called after it. In its present shape, this translation dates probably from the end of the 3d or beginning of the 4th c., though snatches of it were collected and written down more than 100 years earlier. For its language and general character, see ONKELOS. It is composed in an Aramaic closely resembling that of Daniel; and it is an excellent translation 'for the people,' which was its purpose. Occasionally, when the subject imperatively demands, it introduces some paraphrastic by-work, and it deviates from the text only where the divine dignity would have appeared to suffer in the eyes of the multitude by too literal interpretation. Its value for exegetical purposes is no less than for linguistic and antiquarian purposes.

The two other Targums on the Pentateuch, hitherto

known as Targum Jonathan ben Uzziel, and Targum Jerushalmi, are merely recensions of one and the same version—the name of the first recension being simply a perpetuated error of a single scribe—which earlier version owes its origin to Palestine or Syria (ONKELOS being of Babylonian origin), and can scarcely have been redacted before the 7th c. There is no doubt that originally this 'Jerusalem Targum' embraced the whole Old Test., as did the Babylonian; but nothing of it has survived beyond these two recensions of the Pentateuch—the first complete, the second fragmentary: the former probably intended as an emendation of Onkelos, chiefly in the direction of homiletic paraphrase and legendary lore, and the latter as a further emended emendation of single portions. As a version, this T. is of small importance; but it is invaluable as a storehouse of allegories, parables, sagas, and like popular poetry of its time. Its language and grammar are exceedingly corrupt; moreover, it abounds with foreign—Greek, Latin, Persian, and Arabic—terms; and its general use lies more in the direction of Jewish literature itself, as well as of archeology and antiquities of the early Christian centuries, than in that of a direct interpretation of the Bible text itself. The T. on the Prophets is generally and erroneously ascribed to Jonathan ben Uzziel, eminent master of the law at the time of Hillel the elder; the fact being that, except one spurious Talmudical passage, in which mention is made of his having translated the Prophets, this T. is everywhere else, from the Talmud down to the authorities of the 10th c., ascribed to one R. Joseph, pres. of a Babylonian acad. in the 4th c. And indeed this ascription of it to R. Joseph seems completely in accord with the facts—if not the writing, but the collection and final redaction of this T. is ascribed to him. As to the nature of this version—while approximately literal in the first (historical) books, it gradually becomes a mere framework of Midrash (q.v.) or Haggada, which it introduces at every turn and at great length. It further contains historical bits, disguised, or rather typified, and some lyrical pieces of poetical value. In language and general manner, it resembles Onkelos, with which it is of one growth, place, and date, and of which it forms a kind of continuation.

To the same Joseph 'the Blind' to whom probably is due the redaction of the foregoing T., is further ascribed a T. on the Hagiographa. But between him and the Hagiographical Targums lie at least 600 years; their date being approximately given as about 1,000. Certain distinctions between the different books must further be made. The Targums on Psalms, Job, and Proverbs were probably contemporaneous compositions due to Syria. The two former are more paraphrastic than the last, which resembles closely the Syriac version. The paraphrase on the five 'Megilloth'—a very late production indeed—is principally a collection of more or less poetical fancies, traditions, and legends, to which the single verse in hand seems merely to furnish the key-note. Thus there is very little in them of

what originally must have formed the T. on these books; nor is the slightest hint given as to the real author or editor of their present form. That it was one man's work is probable, from a certain unity of design and style noticeable in all. Their dialect lies somewhat between the e. and the w. Aramaic. The T. on the Book of Chronicles —almost unknown until the 17th c.—also belongs to a late period, and was composed probably in Palestine. There are some useful philological, historical, and chiefly geographical hints to be gleaned from it, but nothing more; least of all can it be used exegetically. A Persian version of a T. on Daniel (unedited) is all that has been discovered on that book as yet: it was composed probably in the 12th c., the influence of the early Crusades being plainly visible in it. On the paraphrase of the apocryphal pieces of Esther, we do not enlarge here, any more than on the scanty fragments of a 'Palestinian Targum' found either interspersed in the general (Babylonian) T., or as independent pieces. It seems probable that more of this Palestinian version will yet come to light, as authorities of a few centuries back still quote from it rather largely. At present, however, their quotations are nearly all that is known of it.

Very little has been done to utilize this important branch of Aramaic literature: no attempt at a critical edition has been made, though it would be difficult to find a more corrupt text than that offered by the MSS. and single printed portions. Some parts have been done into Latin, English, German, etc. The ed. pr. of Onkelos is dated Bologna 1482; that of the T. on the Prophets, Leiria 1494.

TARIFA, *tâ-rē'fâ:* seaport town of Spain, 21 m. w.s.w. of Gibraltar; the most southern town of Europe. It is surrounded by tower-embattled walls, and communicates by a causeway with a small island, on which stand a fortress and light-house. The town is the most thoroughly Moorish in Andalusia; it is quadrangular in shape, and its streets are narrow and dark. Tunny and anchovy fisheries are actively carried on.—Pop. (1887) 13,206.

T. (the Carthaginian *Josa* and the Roman *Julia Traducta*) received its present name from the Moors, who are said to have called it after Tarif (= Tarik?) Ibn Malik, who landed there to reconnoitre previous to the conquest of the country: see MUZA: RODERIC. It was successfully defended 1811 by 2,500 troops (mostly British) against a French force of 10,000 men under Victor and Laval.

TARIFF, n. *tăr'ĭf* [Turk. *tarif*, an explaining, a describing: Ar. *tarif*, explanation—from *arf*, knowledge: F. *tarif;* Sp. *tarifa;* It. *tariffa*]: table or book of rates or duties to be paid on goods imported or exported; a fixed scale of duties levied by govt. on imports: V. to make a list of duties payable on merchandise. TAR'IFFING, imp. TAR'IFFED, pp. *-ĭft. Note.*—Trench, *On the Study of Words.* says that the true origin of TARIFF is from *Tarifa* (q.v.), name of a town and promontory in s. Spain extending into the Straits of Gibraltar, on which was a castle: here, when Spain was in their possession, the Moors levied a fixed

duty on the merchandise in all vessels entering the Mediterranean.—A *Tariff* may be imposed only for revenue, or only for protection against foreign competition, or for a combination of these two purposes in various proportions, or for other purposes.

A PROTECTIVE TARIFF is a schedule of duties laid on imports, for protection of domestic producers against the hurtful competition of foreign producers. A purely protective T. levies duties only on articles of import that are economically produced or producible in the importing country; e.g., in the United States, on foreign-made cutlery. Foreign commodities not economically produced or producible in the importing country are of course not fit subject of a protective T., though nearly always to some extent included in the schedules of tariffs summarily designated as 'protective.' Hence when the schedules of a U. S. tariff law comprise such products as tea, coffee, cocoa nibs, the object of the impost is not protection of domestic tea, coffee, or cocoa culture, but either revenue or some incidental advantage—e.g., the object may be to afford to the govt. of the importing country a ground on which it can, by remitting or by enforcing the T., promote the foreign commerce of its own citizens.—By its very name, a protective T. is distinguishable from a statute of prohibition of foreign importation. The two measures may have an identical end—promoting home production and home industries; but the fundamental difference is that by prohibition an absolute, by protection a restricted, monopoly is assured to the producers and manufacturers of the protected country.—The theory of economic development by protective tariffs is clearly and forcibly expounded by Friedrich List (d. 1846), a German economist who while an exile in America became imbued with Alexander Hamilton's doctrine of protection, and whose writings in turn influenced that great American economic writer Henry C. Carey. List's *Nationales System der Politischen Oekonomie* (6th ed. 1877) has been translated into English (*National System of Political Economy*); it is an authoritative exposition of protectionism, and his exposition of the theory of economic development fairly represents the protectionist argument. His theory postulates three stages of economic evolution; viz., (1) agriculture, (2) agriculture united with manufactures, (3) agriculture, manufactures, and commerce combined. The economic task of the state, according to List, is to bring into existence through legislative and administrative action the conditions required for the progress of the nation through these three stages. Every nation, he holds, should begin with free trade, stimulating and improving its agriculture by intercourse with richer and more cultivated nations, importing foreign manufactures and exporting raw products. But when it is economically so far advanced that it can manufacture for itself, then a system of protection is needed to allow the home industries to develop themselves fully, and to save them from being overpowered in their earlier efforts by the competition of more matured

foreign industries in the home market. When the national industries have grown so strong as to be in no fear of this competition, then the highest stage of progress is reached, and free trade should be the rule. When List wrote, he classified the principal nations according to these three stages of development: this classification (according to his theory) has since been largely changed by economic advance in such nations as Germany, France, and the United States.

Prof. Robert E. Thompson, in stating the argument for a protective T., recognizes the same division of the 'industrial state' into three classes—agricultural, manufacturing, and commercial. If the world were in an ideal state of harmony, the policy of *laissez faire* would, Thompson admits, be the true one for the industrial state—for farmer, manufacturer, and merchant. But the world is far from such harmony; there is a sharp conflict of class interests; and to adjust the balance and give all classes fair and equal opportunity, governmental direction is necessary. 'Buying in the cheapest market, selling in the dearest market,' may, in the un-ideal state, lead to financial ruin. 'The actual world,' says Prof. Thompson, 'is full of inequalities and disadvantages.' Unrestricted trade between nations in all grades of advance of necessity hinders development of industries in those least advanced. Especially is this result seen in new countries, whose settlers bring with them from their former homes many needs that can be met only by provision of many objects of luxury and convenience, while the industries of the new country, requisite to supply these wants, are undeveloped. 'Until such a country has attained a diversified industry, advanced at nearly all points to full equality with that of the most advanced nations,' its manufacturing class must be protected against the competition of outside manufacturers.

In Great Britian, the model free-trade country, the present T. subjects about 20 kinds of merchandise to an import duty, and none to an export duty.

In the United States, the first T. law enacted by congress (1789) was inspired by Alexander Hamilton, and was frankly for 'protection of domestic manufactures.' The duties ranged from 7½ to 10 per cent. (average 8½ per cent.) *ad valorem*—an insignificant burden if viewed from the present development of commercial agencies, but in 1789 it meant a material addition to the already very high transportation charges of that day; indeed the transportation charges alone must have seemed almost prohibitive. Various manufactures that had been largely developed during Jefferson's embargo and the war of 1812 were threatened with extinction after the return of peace, by the influx of British products. Accordingly the T. of 1816 imposed a protective duty of 25 per cent. on woolen and cotton fabrics, and specific duties on iron goods. In 1824, and again 1828, protective tariffs were enacted, imposing an average duty of 37 per cent. and 44 per cent. respectively on the commodities enumerated in the schedules. The protective system was more effectively organized by the T. of 1832:

that act provoked the nullification manifesto of the South Carolina convention; and in the political crisis of the democratic party, produced by the disaffection of the non-manufacturing south, congress enacted (1833) a compromise T. scaling down all duties. But a protective T. was again enacted 1842; again, however, the T. of 1846 reduced duties and aimed to eliminate all protective features. The republican party made its first appearance in national politics 1856, and pronounced in favor of internal improvements to be carried on by the general govt.—a policy that logically involved protection, if not in form, at least in effect, for the works were to be paid for out of increased customs revenues. The enormous expenditure of the govt. on account of the secession war necessitated greatly increased taxation both of imports and of sundry domestic products; the Morrill T. of 1861, and other revenue laws enacted during the war, raised the average rates on dutiable articles to nearly 50 per cent. *ad valorem*. This T. legislation was in effect highly protective, and under it domestic manufactures were enormously stimulated. The T. rates were reduced 1883, by 'an act to reduce internal-revenue taxation, and for other purposes;' still the new act was protective.

The T. of 1890 (McKinley Act) was the most thorough and most consistent piece of legislation ever enacted in the United States for protection of home iudustries, and therefore called forth the most earnest antagonism of those who deem the 'protection' principle fundamentally unjust and unsafe. The 'Administrative Act' of the same congress (52d) reinforces the T. act by further imposts on imported goods; by the Administrative Act 'all cartons, cases, crates, boxes, sacks, and coverings of any kind, and all other costs, charges, and expenses incident to placing the merchandise in condition packed ready for shipment to the United States,' are to be included in estimating the dutiable value of goods subject to *ad valorem* duties.

A platform favoring a tariff for revenue only was adopted by the democratic party in 1892, the principles of which were embodied in the so-called 'Wilson bill,' which provided for the abolishment, within one year, of about 38 per cent. of the duties then being paid, and for placing on the free list manufactures and farm products paying from 50 to 60 per cent. duties. The bill as sent to the senate provided for material reduction on specific duties, and liberally provided for *ad valorem* duties; but the senate's amendments to the bill gave it very much the general character of the act of 1883—a compromise scaling down all duties. The bill became a law in 1894, without Pres. Cleveland's signature. This bill provided for a tax of 2 per cent. on all incomes over $4,000 per annum, the tax being laid on the excess over that amount, and it was estimated that a revenue of $50,000,000 would flow from this source; but in 1895 the supreme court declared the law unconstitutional so far as it provided for a tax on incomes from real estate or from state bonds, and on a rehearing of the case the same court declared the whole law unconstitutional.

TARIFF.

The tariff question formed a conspicuous feature of both the republican and the democratic platforms adopted by the national conventions that respectively nominated candidates for pres. and vice-pres. 1896, the republicans advocating a tariff for both protection and revenue, and the democrats a tariff for revenue only. The republicans having been successful in the election, on the opening of an extra session of congress 1897, Mar. 15, Mr. Dingley, chairman of the committee on ways and means, introduced into the house a new tariff bill embodying the declared principles of the republican party. This bill passed the house July 19, and the senate July 24. The following 'compromise' on sugar-rates, reported by the conferrees of both houses, was adopted:

'Sugars not above No. 16 Dutch standard in color, tank-bottoms, syrups of cane-juice, melada, concentrated melada, concrete and concentrated molasses, testing by the polariscope not above 75°, ninety-five one-hundredths of one cent per pound, and for every additional degree shown by the polariscopic test thirty-five one-thousandths of one cent per pound additional, and fractions of a degree in proportion; and on sugar above No. 16 Dutch standard in color, and on all sugar which has gone through a process of refining, one cent and ninety-five one-hundredths of one cent per pound; molasses testing above 40° and not above 56°, three cents per gallon; testing 56° and above, six cents per gallon; sugar-drainings and sugar-sweepings shall be subject to duty as molasses or sugar, as the case may be, according to polariscopic test.'

An estimate based largely on computations by the chief of the U. S. Bureau of Statistics gave the sum of $176,884,000 as likely to be realized in the first fiscal year of the new tariff operation. Numerous protests were uttered by foreign nations—notably Germany, Italy, and Austria—against the proposed increase of rates and the discriminatory features of the tariff bill. By the end of June, 1897, no fewer than 15 nations had either made formal diplomatic protest against, or had expressed in their legislative assemblies dissatisfaction with, some of the clauses.

International Reciprocity expresses the relation between two (or more) nations, wherein they are pledged to treat each other in the same manner with regard to a similar subject or group of subjects; a reciprocity treaty contemplates equality of commercial privileges between the subjects of the govts. concerned. A reciprocity treaty may be without any other stipulation save that each party shall enjoy the privileges of 'the most favored nation' within the jurisdiction of each other party. The reciprocity section of the U. S. T. law of 1890 provides that 'on and after July 1, 1892, whenever . . . the president shall be satisfied that the govt. of any country producing . . . sugars, molasses, coffee, tea, and hides . . . imposes duties . . . upon the agricultural or other products of the United States which, in view of the free introduction of such sugar, molasses . . . into the United States, he may deem to be reciprocally unequal and unreasonable, . . . it shall be his duty to suspend . . . the pro-

visions of this act relating to the free introduction of such sugar, molasses, . . . the production of such country, for such time as he shall deem just. . . .'—Within a few months after this act, treaties of reciprocity were entered into with several countries. The provisions for reciprocity in the Dingley bill empower the pres. to suspend a limited number of duties in return for concessions, and to impose others when he deems retaliation necessary to equalize trade conditions. Reciprocal trade treaties negotiated by the pres. are to be submitted to the senate.

See FREE TRADE: BOUNTY: CORN LAWS: ANTI-CORN-LAW LEAGUE: CUSTOMS DUTIES: POLITICAL ECONOMY.

Among the works to be consulted for exposition of the benefits of protective tariffs are: the writings of Henry C. Carey, and in particular his *Principles of Social Science;* Horace Greeley's *Essays on Political Economy;* Joseph Wharton's *International Industrial Competition;* David H. Mason's *How Western Farmers are Benefited by Protection;* Robert E. Thompson's *Social Science and National Economy;* the translation of List's work above mentioned, and his *Gesammelte Werke.*

TARIM' RIVER: see TURKESTAN, EASTERN.

TARLATAN, *târ'la-tan:* thin gauze-like fabric of cotton, used for ladies' ball-dresses, etc. It is usually dyed or printed in colors. Tarare, in France, is the chief centre of this manufacture, whence it is largely exported. Switzerland alone competes with France in this production, but the French T. far surpasses the Swiss in fineness.

TARLETON, *târl'ton*, Sir BANASTRE: 1754, Aug. 21—1833, Jan. 23; b. Liverpool: Eng. milit. officer. He entered the British army as cornet at an early age; accompanied Lord Cornwallis to America 1776, May; and served in subordinate posts till 1779. He then organized a force of cav., inf., and light artil., known as 'Tarleton's Legion,' and with the rank of lieut.col. went with Sir Henry Clinton to S. C., and carried on a cruel partisan warfare till his force was almost entirely annihilated by Gen. Daniel Morgan (q.v.) in the battle at Cowpens (q.v.) 1781, Jan. 17. After this he was with Cornwallis till the surrender at Yorktown. Returning to England, he was promoted col.; was member of parliament 1790–1806 and 1807–12; was promoted lieut.gen. 1817; and made a baronet 1818.

TARN, n. *târn* [Icel. *tjörn*, a little lake]: a small mountain-lake; a marsh; a bog.

TARN, *târn:* dept. in s. France, formed 1790 from the old prov. of Languedoc; bounded n. by the depts. of Aveyron and Tarn-et-Garonne; named from the river Tarn; 2,216 sq. m. The surface is in general elevated, and in the s. and s.e. are the Montagnes Noires and the Monts de l'Espinous, branches of the Cévennes Mts. The rock of Montalet, principal summit, is 4,430 ft. high. Wooded mountains, vine-clad hills, beautiful valleys, and fertile or grass-producing tracts, are principal features of the landscape. The chief river is the Tarn, affluent of the Ga-

ronne (q.v.), having a westward course of 200 m. A fifth part of the surface is covered with forests, chiefly oak and beech. The dept. is mostly agricultural, and the most improved methods are in use. Eleven million gallons of wine are made in average years. T. is divided into four arrondissements: Albi, Castres, Gaillac, and Lavaur. Cap. Albi.—Pop. of T. (1886) 358,757; (1896) 339,827.

TARN-ET-GARONNE, *târn-ā-gâ-rōn':* small dept. in s. France, bounded s.e. by the dept. of Tarn; 1,435 sq. m. The principal river is the Garonne, which flows n.w., and its affluents, the Tarn and Aveyron. The surface is marked by plateaux, about 1,000 ft. in average altitude; the highest hills do not rise above 1,600 ft. The climate is healthful and temperate. Cereals are raised in great quantities. Of wine, 11,000,000 gallons are produced. The dept. is divided into the three arrondissements, Montauban, Castel-Sarrasin, and Moissac. Montauban is the capital.—Pop. (1896) 309,191.

TARNISH, v. *târ'nĭsh* [F. *ternissant,* tarnishing—from *ternir,* to make dim: OHG. *tarnjan,* to obscure: AS. *dernan,* to conceal]: to diminish the lustre or purity of; to sully; to stain; to soil; to become dull or dim: N. a spot; a stain. TAR'NISHING, imp. TAR'NISHED, pp. *-nisht:* ADJ. dulled in brightness by exposure to the air; sullied.

TARNOPOL, *târ-nō'pol:* town of Austria, in Galicia, charmingly situated on the left bank of the Sered, 80 m. e.s.e. of Lemberg. Agriculture employs the great mass of the inhabitants, and the periodical horse-market is the most important in Galicia. Pop. (1885) 27,000, about half of them Jews; (1890) 26,217; (1900) 30,415.

TARNOW, *târ'nŏv:* town of Austrian Galicia, near the right bank of the Dunajec, a navigable tributary of the Vistula; 49 m. e. of Cracow by the Vienna and Lemberg railway. It is the seat of a Rom. Cath. bishop; contains a theological college, and a beautiful cathedral in which are numerous monuments of marble, surmounted by statues, enriched with *bassi rilievi,* and rising 60 to 70 ft. Several industries are actively carried on. Pop. (including suburbs) (1880) 24,627; (1890) 27,574.

TARPAULIN, n. *târ-paw'lin:* a *tarred pall* or covering; a sheet of coarse linen or hempen cloth, saturated with tar to render it waterproof: used for covering loaded wagons, hatchways of ships, etc. Also a sailor's waterproof hat; *familiarly,* a sailor; written also TARPAU'LING or TARPAW'LING.

TARPEIAN, a. *târ-pē'ăn* or *-pē'ĭ-ăn:* named after Tarpeia, daughter of Sp. Tarpeius, gov. of the Roman citadel on the Capitoline, who, covetous of the golden ornaments on the Sabine soldiery, and tempted by their offer to give her what they wore on their left arms, opened a gate of the fortress to Titus Tatius, who had come to revenge the rape of the Sabine women. 'Keeping their promise to the ear,' the Sabines crushed Tarpeia to death beneath their shields, and she was buried in the part of the hill which bears her name. TARPEIAN ROCK (L. *Rupes Tarpeia,* or *Mons*

Tarpeius), originally, the whole of the Capitoline Hill at Rome (see CAPITOL): later the name was confined to that part of the hill in which Tarpeia was buried, and from whose rocky brow persons convicted of treason to the state were hurled.

TARPON, *târ'pŏn*, or TAR'PUM, *-pŭm:* the gigantic Silver-fish (*Megalops thrissoides*); best known by its huge, circular, silvery scales, 2½ inches diam., distributed as curiosities or used in fancy-work, and brought usually from Fla., though the fish ranges from Cape Cod to Brazil. It attains 5–6 ft. length, and stuffed specimens are in the windows of city restaurants. It ascends rivers, where it is sometimes harpooned; it is difficult to land with the hook, and jumps over or tears seines. Its flesh is said to be of good flavor. Other names are Grande Écaille, Jew-fish, Savanilla.—For T.-fishing, see ANGLING.

TARQUINIUS PRISCUS, *târ-kwĭn'ĭ-ŭs prĭs'kŭs*, LUCIUS: fifth legendary king of Rome; of date unknown, but previous to B.C. 509 (see ROME); son of Demaratus, a Corinthian noble, who emigrated from Greece and settled at Tarquinii, in Etruria, where he married an Etruscan wife, by whom he had two sons, Aruns and Lucumo. Lucumo married into one of the chief Etruscan families. By advice of his wife, Tanaquil, bold, ambitious, and skilled in augury, Lucumo went to Rome, accompanied by a large train of followers. He was hospitably received and soon admitted to citizenship, whereupon he took the name Lucius Tarquinius Priscus (according to Livy). The Roman king, Ancus Marcius, appointed him guardian of his children; and on the death of the king, T. P. was chosen his successor. His reign was renowned for splendor and success, as the legends recite. Against the Latins, Sabines, and (according to Dionysius) the Etruscans, he warred prosperously, forcing all the 12 sovereign cities of Etruria to do him homage. To him are ascribed the construction of the great *Cloacæ*, or sewers (see, however, CLOACA MAXIMA), which remain uninjured to this day; the laying out of the Circus Maximus and the Forum; the institution of the great or Roman games; and (some say) the building of the Capitoline temple (see CAPITOL). The legend also represents him as effecting certain political and sacerdotal changes: see ROME. T. was assassinated after a reign of 38 years, at the instigation of the sons of Ancus Marcius, who considered themselves entitled to the throne. But by the dexterity of Tanaquil, his son-in-law, Servius Tullius, was chosen as his successor. He signalized himself by military exploits and by organic changes in the Roman constitution (see ROME for an account of the 'Servian Reform').—T. left two sons, L. Tarquinius Superbus and Aruns, both of whom married daughters of Servius Tullius; and two daughters, one of whom married Servius Tullius himself, and the other M. Brutus, by whom she became mother of L. Brutus, first consul of the Roman republic.—It should be noted that the annals of the Tarquins, as given by Livy, are largely recitals of mere legends.

TARQUIN'IUS SUPERBUS, *sū-pĕr'bŭs*, LUCIUS: seventh legendary king of Rome; of date unknown, but probably not long previous to B.C. 509; son of Tarquinius Priscus. Having murdered his father-in-law, Servius Tullius, at the instigation of his wife, he is represented in the legend as audaciously usurping the throne; but as his legislative policy was to abolish the reforms of Servius, he doubtless represents a successful reaction of the patricians against the more liberal and progressive policy of the preceding age. That this younger Tarquin, at least, is a historical character seems probable. The incidents of his career are so numerous and coherent, and the impress of his name and character is so deeply stamped on the national memory, that he cannot be regarded as a wholly imaginary personage. As far as we can gather from the ancient annals, it does not appear that all the senators connived at T.'s procedure; for we are told of his banishment of his opponents. He strengthened himself by foreign alliance, marrying his daughter to Octavius Mamilius, Prince of Tusculum. By subtle and unscrupulous intrigues, Tarquin the Proud consolidated the Roman hegemony in Latium; offered sacrifice in the name of all the Latins at the Alban Mount; fused the contingents of the Latins with the Roman legion; and, at the head of the combined forces, subdued the dwellers in the Volscian marshes. On his return he completed the Capitol, which Tarquinius Priscus had begun, and deposited in the vaults the Sibylline books (see SIBYL). But his lavish expenditure necessitated heavy taxes, and discontent grew among both plebs and patricians. The king, having opened war on the Rutuli, was besieging Ardea, and in his camp occurred, between Sextus (Tarquin's son) and Collatinus, the famous dispute about the virtues of their respective wives, which led to the rape of Lucretia by Sextus. The legendary details of this outrage, with its result in Lucretia's stabbing herself, are familiar. The tragedy roused such a storm of indignation that the people of Collatia (where the shameful deed was done) rose in arms and renounced their allegiance to Tarquinius. Brutus carried the news to Rome, and the senate, in anger, deposed the tyrant; finally, the army before Ardea also revolted. T. and his sons fled, and an aristocratic republic was constituted at Rome. Three different attempts were made to restore T. by force: first, by his own Etruscan kinsmen of Tarquinii; second, by Lars Porsena (q.v.) of Clusium; third, by his son-in-law, Octavius Mamilius, 'prince of the Latian name,' all of which, according to the legend, failed; and at length T., utterly baffled, retired to Cumæ, where he died, a wretched and childless old man; for all his sons had met death before him.

TARRAGON, n. *tăr'rā-gŏn* [OF. *targon;* It. *targone;* Sp. *taragona*—from Pers. *tarkhûn*, dragon-wort]: aromatic plant used in pickles and salads, and in the perfuming of vinegar; herb-dragon; the *Artemisia dracun'cŭlus;* see ARTEMISIA.

TARRAGONA, *târ-râ-gō'nâ:* seaport of Spain, cap. of the modern province of T.; on the Mediterranean shore, at the mouth of the Francoli; 60 m. w. of Barcelona. It consists of two portions—the upper (the ancient) and the lower (the modern) towns. The former stands on a hill 720 ft. high, and is girdled with ramparts. The lower town, completely separated from the higher by a line of works, is regular and open, and defended by two forts. The beautiful cathedral, in Gothic and Norman, dating from the middle of the 12th c., is the principal edifice. There is an interesting antiquarian museum. Brandy-distilling and manufacture of wines and olive-oil are the chief industries. Pop. (1877) 23,046; (1887) 27,225.

T., called by the Romans *Tarraco*, was founded by the Phœnicians (who called it *Tarchon*, citadel), and afterward became capital of the Roman province of Tarraconensis. Among its Roman antiquities are the remains of an amphitheatre, which has been used as a quarry; a magnificent aqueduct, 96 ft. high and 700 ft. long—still in use; and near the town the Tower of the Scipios, much decayed. T. was taken and cruelly sacked, 1813, June, by the French under Suchet.

TARRED: see under TAR 1.

TARRIANCE: see under TARRY.

TAR RIVER: see PAMLICO RIVER.

TARRY, v. *tăr'rĭ* [F. *tarder*, to delay, to tarry—from L. *tardārĕ*, to delay—from *tardus*, slow]: to continue in a place; stay behind; delay; loiter; linger; wait. TAR'RYING, imp.: N. delay. TAR'RIED, pp. *-rĭd*. TAR'RIER, n. *-rĭ-ĕr*, one who tarries; a species of dog—now spelled *terrier*. TAR'RIANCE, n. *-ăns*, in *OE.* or *poetry*, delay; lateness.

TARRY: see under TAR 1.

TARRYTOWN, *tăr'ĭ-town:* village in Westchester co., N. Y.; on the e. bank of the Tappan Zee (wide portion of the Hudson river), and on the New York Central and Hudson River and the New York and Northern railroads; 26 m. n. of New York. It contains 11 churches, College Hill Seminary, excellent public and private schools, several hotels and summer boarding-houses, many elegant residences of New York business men, a monument commemorating the capture near T. of Maj. John André (q.v.) 1780, 1 national bank (cap. $100,000), 1 savings bank, and 2 weekly newspapers. Near T. are 'Sunnyside,' home and burial-place of Washington Irving; and 'Sleepy Hollow,' the scene of his *Legend;* and the vicinity is immortalized in his *Rip Van Winkle*. Pop. (1880) 3,025; (1890) 3,901; (1900) 4,770.

TARSHISH, *târ'shĭsh:* probably the same as *Tartessus*, which was a city and emporium of the Phœnicians in Spain, somewhere near the mouth of the Guadalquivir. It is frequently mentioned in Scripture in connection with shipping. The name T. may have been applied also to a region in Spain; and some scholars have supposed that there was a port of this name on the Indian Ocean also.

TARSIA-WORK, *târ'sĭ-â-wĕrk:* beautiful kind of marquetry made in Italy, by inlaying pieces of colored wood to represent figures and landscapes—usually applied to decorate cabinet-work. That of Sorrento is very celebrated; and many fine pieces have been made in Perugia.

TARSUS, n. *târ'sŭs* [Gr. *tarsos*, the sole of the foot, the edge of the eyelid]: the instep; the cartilage supporting each eyelid; the last segment of the legs of an insect. TAR'SAL, a. *-săl*, pertaining to the instep, or to the cartilage of the eyelid. TAR'SO-MET'ATAR'SUS, n. *târ'sō-*, the single bone in the leg of birds, produced by the union and anchylosis of the lower or distal portion of the tarsus with the whole of the metatarsus: see METATARSUS.

TARSUS, *târ'sŭs:* anciently the chief city of Cilicia, one of the most important in Asia Minor; situated on both sides of the navigable river Cydnus, in a beautiful and productive plain, about 18 m. from the sea. It was a great emporium for traffic between Syria, Egypt, and central Asia Minor. In the time of the Romans, two great roads led from T., one n. across the Taurus by the 'Cilician Gates,' the other east to Antioch by the 'Amanian' and 'Syrian Gates.' T., judging from its name, was probably of Assyrian origin; but the first historical mention of it occurs in the *Anabasis* of Xenophon, where it figures as a wealthy and populous city, ruled by a prince tributary to Persia. A Moslem general estimated from its ruins, about the 7th c., that its former pop. had been 100,000. In the time of Alexander the Great, it was governed by a Persian satrap; it next passed under the dominion of the Seleucidæ, and finally became cap. of the Roman province of Cilicia. At T., Antony received Cleopatra, when, arrayed as Aphrodite, she sailed up the Cydnus with magnificent luxury. Under the early Roman emperors, T. was as renowned for culture as for commerce; Strabo ranked it, in zeal for learning, above even Athens and Alexandria. It was the birthplace of the apostle Paul, who received the greater part of his education here; and here the emperor Julian was buried. Gradually, during the confusions at the decline of the Roman and Byzantine power, it fell into comparative decay; but even yet it is—under the name of *Tarso* or *Tersus*—the most considerable place in s.e. Asia Minor, and exports corn, cotton, wool, copper, gall-nuts, wax, goats' hair, skins, hides, etc.—Pop. about 30,000 (in winter).

TART, a. *târt* [AS. *teart*, sharp]: sour; acid; sharp; keen; severe, as a reply. TART'LY, ad. *-lĭ*, sharply; sourly; with sourness of aspect. TART'NESS, n. *-nĕs*, sharpness to the taste; sharpness of language or manner; sourness; sourness of temper. TART'ISH, n. *-ĭsh*, somewhat tart.—SYN. of 'tartness': sourness; keenness; acrimony: severity; asperity; poignancy; harshness; acerbity; animosity.

TART, n. *târt* [F. *tarte, tourte*, a tart, a pie: It. *torta*, a kind of pastry-work: so called from the paste being twisted together—from L. *tortus*, twisted, pp. of *torquērĕ*, to twist]: a small pie consisting of fruit inclosed in pastry and baked. TART'LET, n. a little tart.

TARTAN, n. *târ'tăn* [F. *tiretaine;* Dut. *tireteyn,* linsey-woolsey: comp. Sp. *tiritaña,* a thin woolen cloth, sort of thin silk]: woolen cloth or stuff checkered or striped in various colors and patterns in the weaving, each Highland clan having a different pattern: it is sometimes called 'plaid' (*plăd*). The word tartan is given sometimes to the pattern only, and not to the stuff: ADJ. consisting of or resembling tartan cloth. *Note.*—TARTAN is said by Wedgwood to be unknown in Gaelic. Michel asserts that *tartan* and its manufacture were introduced from France into Scotland probably early in the 15th century.

TARTAN, or TARTANE, n. *târ'tăn* [It. *tartana*—from Ar. *tarrad,* a small swift ship]: a small swift coasting-vessel, having one mast and a very large sail; used in the Mediterranean.

TARTAR, n. *târ'tĕr* [F. *tartre,* tartar—from the alchemist's mid. L. *tar'tărum,* the crust on the sides of wine-vessels]: reddish acid substance which gathers on the sides of casks and vats containing wine, in the form of a hard crust. In its crude form it is called Argal or Argol (q.v.), and is a considerable article of export in wine-producing countries. The name is also applied to a white crust which sometimes forms on the teeth (see TARTAR OF THE TEETH). TARTARIC, a. *târ-tăr'ĭk,* of or from tartar; applied to an acid found in tartar, and in the juice of grapes and other fruits (see TARTARIC ACID). TARTARIZE, v. *târ'tĕr-īz,* to impregnate or combine with tartar; to form and deposit tartar, as wines. TAR'TARIZING, imp. TAR'TARIZED, pp. *-īzd:* ADJ. impregnated with tartar. TARTAREOUS, a. *târ-tārĕ-ŭs,* in *bot.,* having a rough crumbling surface. TAR'TAROUS, a. *-tĕr-ŭs,* consisting of or resembling tartar. TARTRALIC ACID, *târ-trăl'ĭk,* peculiar acid into which *Tartaric Acid* (q.v.) is converted by heat. TARTREL'IC ACID, *-trĕl'ĭk,* acid into which *tartralic acid* is converted by heat. TARTRATE, n. *târ'trāt,* a salt of tartaric acid. CREAM OF TARTAR (see TARTARIC ACID). TARTAR EMETIC (see TARTARIC ACID). FOLIATED EARTH OF TARTAR, an old name for acetate of potash, from the foliated satiny masses in which that salt occurs. SOLUBLE TARTAR, term applied by some chemists to neutral tartrate of potash; by others to borotartaric acid: see TARTARIC ACID.

TARTAR, n. *târ'târ* [Pers. *Tátár,* a Tartar]: inhabitant or native of *Tartary* (see TARTARS): one who proves too strong or cunning for his assailant, as in the phrase, 'to catch a Tartar.' TATAR, n. *tâ târ,* though less common, is the better spelling, and the word is so written by modern travellers.

TARTAR, n. *târ'târ* [see TARTAREAN]: in *OE.,* the infernal regions; hell; Tartarus (q.v.).

TARTAREAN, a. *târ-tā'rĕ-ăn,* or TARTA'REOUS, a. *-rĕ-ŭs* [L. *Tar'tărus;* Gr. *Tar'tăros,* the infernal regions]: of, pertaining to, or characteristic of, the infernal regions; hellish: see TARTARUS.

TARTAR'IC ACID: name given to four compounds of identical chemical constitution, $C_4H_6O_6$, viz., *Dextrotartaric acid*, so called because it turns the plane of polarization to the right; *Lævotartaric acid*, which turns it to the left to an equal extent; *Paratartaric* or *Racemic acid*, which is optically inactive, and separable into dextro- and lævotartaric acids; *Inactive T. A.*, not thus separable. These 4 acids are bibasic. *Dextrotartaric*, or *Ordinary T. A.*, is the acid of grapes, tamarinds, pineapples, and other fruits, in which it occurs in the state of an acid potassium salt, sometimes as a calcium salt. This T. A. forms colorless, transparent, monoclinic crystals, permanent in air and inodorous, dissolving readily in water, both hot and cold, soluble also in alcohol. The solution reddens litmus strongly, and has a pure acid taste. The aqueous solution, as mentioned above, exhibits dextro-polarization. The crystals melt at 275° F., at 338° F. are converted into mesotartaric or inactive T. A., and when heated for some time to 356° F. give off water and yield anhydrides. The ordinary T. A. is largely employed in calico-printing, to evolve chlorine from solution of bleaching-powder, in production of white or *discharged* patterns on a colored ground.—The T. A. of commerce is wholly prepared from *Tartar* or *Argol* (q.v.), impure acid potassium deposited from wine, or rather from grape-juice in fermenting. This substance is purified by solution in hot water, with aid of pipe-clay and animal charcoal, to remove the coloring matter of the grape-juice, and by subsequent crystallization: the product is *cream of tartar*, which serves for preparation of the acid. First the cream of tartar is dissolved in boiling water, and powdered chalk is added as long as effervescence results or the liquid presents acid reaction: calcium tartrate and neutral potassium tartrate are thereby produced, and the latter is separated by filtration from the former, which is insoluble. The solution of potassium tartrate is then mixed with excess of calcium chloride, throwing down all the remaining acid as a calcium salt; this is washed and added to the former portion, and the whole is digested with sufficient dilute sulphuric acid to withdraw the calcium. The filtered solution is carefully evaporated to syrupy consistency, and left in a warm place to crystallize. T. A. is produced also by action of nitric acid or saccharic acid, and is one of the products of oxidation of all those carbohydrates which yield saccharic acid under the action of nitric acid.

Tartaric acid, being tetrahydric (having 4 hydrogen atoms replaceable by other elements) and bibasic, has only 2 hydrogen atoms replaceable by metals, the other two giving way to alcoholic or acid radicals. With monad metals (those which displace one atom of hydrogen: see VALENCY) it forms acid and neutral salts, e.g., $C_4H_5M'O_6$; with diad metals (which displace 2 atoms of hydrogen), neutral salts, e.g., $C_4H_4M''O_6$, and double salts, e.g., *bariopotassic tartrate*, $C_4H_4BaO_6.C_4H_4K_2O_6$. (In the first two examples, M', M'' stand for metals replacing 1 or 2 hydrogen atoms respectively.)

Tartrates of Potassium.—The *neutral* tartrate of potas

sium, $C_4H_4K_2O_6$ (corresponding to the formula $C_4H_4M''O_6$ above), may be obtained by neutralizing cream of tartar with chalk, as already described. The *acid* tartrate of potassium, or *cream of tartar*, $C_4H_5KO_6 + Aq.$, the mode of obtaining which has also been given above, forms irregular groups of small translucent prismatic crystals, which dissolve freely in boiling water; but when the water cools, crystallization sets in again, and less than $\frac{1}{60}$ part remains in solution. Exposed to heat in a close vessel, it is decomposed, evolving inflammable gas, and leaving a mixture of charcoal powder and pure potassium carbonate. For *Tartrate of potassium and soda*, see ROCHELLE SALT. *Tartrate of potassium and iron*, or *Ferrum tartaratum*, $C_4H_4KFeO_6 + Aq.$, and *Tartrate of ammonium and iron*, or *Ammonia-tartrate of iron*, $C_4H_4NH_4FeO_6 + Aq.$, though the latter is not included in the Pharmacopœia, are excellent medicinal preparations of iron. For the method of preparing them, consult Neligan's *Medicines*, 6th ed., 658, etc. They occur in the form of brilliant, semi-transparent, reddish-brown scales, and are soluble in about their own weight of water at 60°. *Tartrate of potassium and boron* $C_4H_4KFeO_6$, known also as *soluble tartar* (though the term has been applied also to tartrate of potash), or *soluble cream of tartar*, has been employed medicinally, but is not now used. *Tartrate of antimony and potassium*, known also as *tartarized antimony* and *tartar emetic*, $2C_4H_4K(SbO)O_6$, is one of the most valuable articles in the *Materia Medica*. This salt occurs in the form of rhombic octahedrons soluble in about 15 parts of cold water and in 3 parts of boiling water. It is somewhat efflorescent, and when dried at 212° F. loses all its water of crystallization; its solution slightly reddens litmus, throws down an orange-colored sulphide of antimony if a current of sulphuretted hydrogen is passed through it, and has a very peculiar, nauseous, metallic taste.

There is no very delicate test for T. A. Its presence in a moderately strong solution may be detected by addition of acetate of potassium, when a sparingly soluble bitartrate is soon separated, especially if the mixture be well stirred. All the tartrates on charring emit a peculiar odor resembling that of burned sugar.

Racemic or *Paratartaric acid*, which, as above remarked has the same formula as ordinary T. A., $C_4H_6O_6$, is a frequent associate of T. A., but is especially abundant in the grapes of the Upper Rhine and the Vosges. It may be distinguished and separated from T. A. by the following points of difference: it crystallizes more readily from solution; it contains two equivalents of water of crystallization; it is less soluble in alcohol; and the racemate of lime is soluble in hydrochloric acid, and is precipitated unchanged on adding ammonia. Its most important difference, however, is, that its solution does not rotate the plane of polarization. *Lævotartaic acid* resembles T. A. in all respects except that it turns the plane of polarization to the left. *Inactive T. A.* or *Mesotartaric acid*, is produced by oxidizing sorbin with nitric acid, and

by sundry other processes. It is much more soluble in water than ordinary T. A., and, as the name *Inactive* indicates, does not deflect the plane of polarization. When heated to 338° F., it is converted into *Dextrotartaric acid* or Ordinary T. A.

T. A. and the tartrates, in medicine, are of considerable importance. Pure *tartaric acid*, in small doses diluted largely with water, forms a good refrigerant drink in febrile and inflammatory affections. It has been stated that persons addicted to drunkenness have been reclaimed by taking in the morning, fasting, two or three draughts of water acidulated with T. A. The painful feeling of sinking and craving of the stomach, of which such persons usually complain, is said to be removed by these acid draughts. Under the name *acidulated drops*, lozenges composed of this acid, sugar, and oil of lemons, are used in mild sore throats and colds. The principal medical use of tartaric acid is in preparation of effervescent draughts, when added to alkaline carbonates; and in the composition of Seidlitz Powders (q.v.). *Tartrate of potassium* is a mild but efficient purgative in doses of two to six drams, which perhaps is less used than it deserves. In passing through the system, it becomes converted into carbonate, and thus renders the urine alkaline. *Acid tartrate*, or *bitartrate of potassium*, commonly known as *cream of tartar*, in full doses, acts as a sharp purgative, but is generally prescribed with some of the milder vegetable cathartics. In small repeated doses (from a scruple to a dram), in a large quantity of water, it largely increases the secretion of urine, and is thus of service in dropsy. It may be agreeably given in either of the following forms: (1) *Imperial*, prepared by dissolving a dram of cream of tartar in a pint of boiling water, and flavoring with lemon-peel and sugar. In incipient dropsy, two tumblers of this mixture, with half a glass of good gin in each, are strongly recommended by Dr. Neligan as an after-dinner drink: the proportion of cream of tartar to the pint of water may be gradually increased to two drams. (2) *Cream of tartar whey* is prepared by boiling 2 drams of the salt in a pint of new milk, and removing the curds by straining. Either of these drinks may be safely taken to any extent agreeable to the patient. *Tartrate of iron and potassium*, the *Ferrum tartaratum*, or *tartarated iron*, of the Pharmacopœia, is a mild chalybeate tonic, which, in consequence of its somewhat sweet taste, is well adapted for children. It occurs in transparent scales of a deep garnet color, is soluble in water, and sparingly soluble in spirit. The dose varies from five grains to a scruple, three times a day, either given with honey or molasses, or dissolved in some aromatic water. The *wine of iron* (*Vinum ferri* of the *Pharm. Brit.*) consists of sherry wine (1 pint) in which iron wire, 1 oz., has been macerated for 30 days: dose 1–4 fluid-drams. The *tartrate of iron and ammonium*, or *ammonio-tartrate of iron*, closely resembles in its action the tartrate of iron and potash: it is 'an excellent preparation of iron, void of all astringency. Its not disagreeable taste,

its solubility in water, its compatibility with the alkaline carbonates, and the permanency of its composition, give it an advantage over most of the other preparations of iron. It is peculiarly suited as a tonic for those derangements of the uterine organs in which ferruginous salts are indicated.'—Neligan's *Medicines*, 6th ed. 645. The dose is five to eight grains, and it may be prescribed in powders, pills, or solution; or made into a bolus with honey. *Tartar emetic*, in doses of one-sixteenth to one-fourth of a grain, frequently repeated, acts as a diaphoretic or sudorific; nausea sometimes accompanies the diaphoresis, but it has the advantage of increasing the tendency to perspiration. The addition of the compound tincture of lavender tends to prevent vomiting. Tartar emetic in these small doses has been considered of great service in febrile disorders, in the hæmoptysis of phthisis, in obstinate cutaneous diseases, etc. *Antimonial wine* consists of sherry holding tartar emetic in solution in the proportion of two grains to the ounce. The dose, to produce a diaphoretic action, is 20 or 30 minims every hour. For an expectorant action—as in acute pneumonia or bronchitis—the salt should be given in still smaller doses, as one-sixteenth to one-twelfth of a grain. Tartar emetic, in doses of 1 to 4 grains, dissolved in water, acts as a powerful emetic, and at the same time produces much nausea and depression, and frequently purging: the vomiting seldom occurs till about 20 minutes after the draught. It has been employed in continued fever, croup, hooping-cough, etc. Formerly it was given to relax the muscular system, in strangulated hernia and dislocation; but chloroform is far better. In cases of poisoning, it is inferior to sulphate of zinc. Such drugs as tartar emetic should not be administered except under medical advice. When in case of necessity resort is had to tartar emetic in the absence of a physician, the dose should be given in parts, as too powerful an effect is thus prevented. By its action in depressing the circulation and lowering the pulse, it acts as a direct sedative or contra-stimulant. Lastly, tartar emetic, applied to the skin, produces a crop of pustules, which ulcerate, and discharge purulent matter. In consequence of this property, tartar emetic, either in the form of ointment or of saturated solution, is often employed as a counter-irritant in various affections of the viscera of the chest and abdomen, in diseases of the joints, etc. The *ointment* is applied by rubbing about half a dram on the skin night and morning: in two or three days, pustules begin to appear, when the further application of the ointment should be temporarily suspended. The saturated solution is a cleaner preparation than the ointment, and acts more speedily: it is applied by means of pledgets of lint soaked in it. Tartar emetic, in excessive doses, or in small repeated doses, acts as an irritant poison: of 37 cases of poisoning by this agent, reported by one writer, 16 were fatal: the smallest fatal dose was in a child *three quarters of a grain*, and in an adult *two grains*, but in the last case there were circumstances conducive to the fatal action of

the poison. The symptoms occurring in chronic poisoning by this salt are 'great nausea, vomiting of mucus and liquids, great depression, watery purging, followed often by constipation of the bowels, small contracted and frequent pulse, loss of voice and muscular strength, coldness of the skin, with clammy perspiration, and death from complete exhaustion. Murder has been perpetrated by the slow action of tartar emetic: Dr. Taylor's *Medical Jurisprudence*, 146 and 250. An antidote, after a large dose of tartar emetic has been taken, has for its ingredients a solution of perchloride of iron and calcined magnesia.

TARTAR OF THE TEETH, *târ'tèr:* deposit of salts of lime and organic matter from the saliva, usually most abundant on the inferior incisors. If allowed to accumulate, it causes inflammation and absorption of the gum, and gradual loosening of the teeth. The accumulation may usually be prevented if due attention is paid to the cleaning of the teeth. The teeth should be cleaned at least twice a day with a soft tooth-powder (precipitated chalk is best) and a little soap—using a brush with soft bristles not too closely set, which can reach the interstices of the teeth. When the tartar has accumulated to any extent, it must be removed by the *scaling instruments* of the dentist.

TARTARS, *târ'târz*, or, properly, TATARS, *tâ'târz:* originally a name of the Mongolic races, but which became extended to all the tribes brought under Mongolic sway by Genghis Khan and his successors, including Tungusic and Turkic races. The term is therefore not to be considered as ethnological—though all, or almost all, the peoples included under it, in its widest sense, belong to the Turanian family—but is to be understood in the same sense as the term 'Franks' used by Mohammedans. In the classification of languages, Tataric has become the distinctive name of that class of Turanian languages of which Turkish is the most prominent, while the Mongolic form a separate class. See TURANIAN LANGUAGES.

TARTARUS, *târ'ta-rŭs* [Gr. *Tartaros*, a name, probably onomatopœic, the reduplication being designed to express something *terrible* or disagreeable, like *Barbaros, Karkaron,* etc.]: according to Homer, a deep and sunless abyss, as far below Hades (q.v.) as earth is below heaven, and closed in by iron gates. Into T., Zeus hurled those who rebelled against his authority, e.g., Kronos and the Titans. Afterward the name was employed sometimes as synonymous with Hades or the under-world generally, but more frequently to denote the place where the wicked were punished after death—the Lowest Hell. A noticeable feature about these punishments is their congruity with the nature of the offenses perpetrated. See HELL: GEHENNA: also HADES: SHEOL: ETC.

TARTARY, *târ'tâ-rĭ* (properly TA'TARY): name under which, in the middle ages, was comprised the whole central belt of central Asia and e. Europe, from the Sea of Japan to the Dnieper, including Manchuria, Mongolia, Chinese Turkestan, Independent Turkestan, the Kalmuck and Kirghis steppes, and the old khanates of Kasan, Astrakhan, and the Crimea, and even the Cossack countries: hence arose a distinction of T. into European and Asiatic. But latterly the name T. had a much more limited signification, including only that tract bounded n. by Siberia and s. by China and Tibet, with Independent Turkestan; at the present day, many writers use it as a synonym for Turkestan (q.v.).

TARTISH, TARTLY, TARTNESS: see under TART 1.

TARTUFE, or TARTUFFE, n. *târ-tôf'* [after *Tartufe*, chief character in Molière's most celebrated comedy]: a hypocritical devotee. TARTUF'ISH, or TARTUFF'ISH, a. *-ish*, hypocritical.—The name *Tartufe* has become a synonym in all languages for a hypocrite in religion. The original of the character was probably a certain Abbé de Roquette, a parasite of the Prince de Conti. The name is said to have suggested itself to Molière on the occasion of a visit to the papal nuncio, where he saw the pious and solemn countenances of the nuncio's courtiers suddenly lighted up with ecstatic animation by the appearance of a seller of truffles—in Italian, *tartuffoli.* This comedy excited greater commotion than perhaps any other ever did. It was written 1664; but before it was brought on the public stage, partial representations of it in private companies had made its character known, and raised the alarm of the priests, who believed themselves specially satirized therein. Uniting with the many enemies whom Molière had already made for himself by lashing pretentious physicians, fops, and fools of all kinds, they used all means to prevent the public representation of the play. The abp. of Paris threatened with excommunication all actors who should take any part in the performance, and even those who should only read it; and one dignitary went so far as to declare that Molière—whom he called a devil in human form—was deserving of the stake. It was not till 1669 that Molière succeeded in producing the play publicly in pres-

ence of Louis XIV.; and then it had an uninterrupted run for three months, to the great vexation of all hypocrites.

TARUDANT, *tâ-rō-dănt':* town, province of Sus, Morocco; 4 m. from the Sus river, 44 m. from the Atlantic Ocean, near the s. slope of the Atlas Mountains. Within recent years it has been garrisoned and fortified by the sultan, and it is now considered the chief frontier post in the empire. It has several mosques; also dye-works, and leather and copperware factories.—Pop. 30,000—40,000.

TASCHEREAU, *tăsh-rō',* ELZEAR ALEXANDER, D.D., J.C.D.: Rom. Cath. prelate and cardinal: b. Sainte Marie de la Beauce, Quebec, Can., 1820, Feb. 17. He entered the ecclesiastical seminary, Quebec, 1829, and was ordained priest 1842. He was then for 12 years prof. of philosophy in the Quebec 'little' seminary. He volunteered to carry the comfort of religion to the victims of ship-fever at Quebec 1847, and was himself stricken by the pestilence. He studied canon law in Rome 1854–56, and took the degree *Juris Canonici Doctor.* He then was in succession director of the 'little' and of the 'great' seminary in Quebec, and rector of Laval Univ. He became abp. of Quebec 1871, and 1886 was created cardinal-priest. He died 1898, Apr. 12.

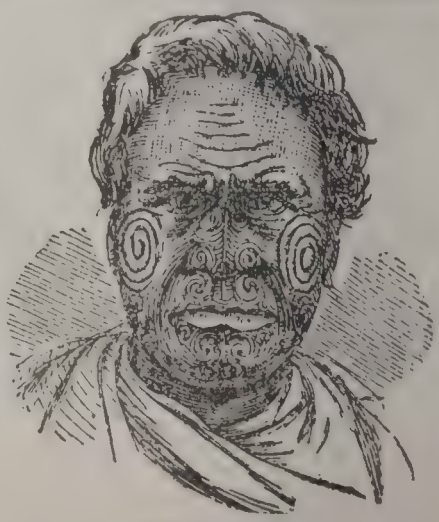
TASHKEND, *tăsh-kĕnd',* or TASHKENT, *-kĕnt':* formerly a town of Independent Turkestan, but now in the possession of Russia; one of the most important cities of central Asia; in the khanate of Khokan, 92 m. n.n.w. of Khokan, the cap.; on the n. bank of the Saralka, a small feeder of the Djirhik river, an impetuous torrent which empties itself into the Syr-Daria. T. is the chief commercial town in the district, the centre of the transit-trade between Bokhara, Khokan, and Chinese Tartary, and has extensive trading relations with Orenburg and Petropavlovsk. Like most of the cities of central Asia, it stands in a fertile plain. It covers a large tract of ground, being said to extend 10 m. in one direction and 5 in another, and is protected by a high wall of sun-dried bricks. Within the walls are numerous gardens and vinyards; the houses are of mud, and thatched with reeds. The streets are narrow and dirty. The chief buildings are the castle (which is fortified), various mosques, colleges, old temples, and a bazaar. The chief manufactures are gunpowder, silk and cotton goods, and iron. T. is important as a military point, and, mainly for this reason, had been long coveted by Russia. The Russians, who captured it 1854, and retained it for a short time, finally took possession of it 1865, having in the meantime made great advances in central Asia. The petition of the inhabitants that they might be received as Russian subjects was granted 1866; and it has since been governed by a kind of municipal board, the pres. being a Russian officer, and the members chosen by the townspeople.—Pop. (1897) 156,414.

Tanager.

Tanghinia venenifera.

Tansy (*Tanacetum Vulgare*).

Tartan.



Tattooing.

TASIMETER, n. *tā-sĭm'ē-tĕr* [Gr. *tasis*, stretching, tension; Eng. *meter*]: in *physics*, instrument, invented by Edison, for measuring very minute variations of pressure, temperature, moisture, etc. It is founded on the discovery of the inventor that carbon, when pressed in the form of a button, affects the electric currents passing through the same, and offers a resistance which diminishes with the pressure. So sensitive is the carbon that, when this pressure varies to the amount of one-millionth part of an inch, the variation in the electric current passing through it will cause a proportional deflection of the galvanometer needle. The T. is an outgrowth of Edison's experiments with that form of telephone with which he sought to vary the intensity of electric waves by means of the human voice. The human finger, held four inches from a T., deflects the needle.

TASK, n. *tâsk* [OF. *tasche;* prov. F. *tasque*, a definite amount of work set for one to do—from L. *taxārĕ*, to estimate: the same word as TAX: comp. Gael. *tasg*, a business, a job]: a certain amount of business or labor imposed by another; something to be learned or done, as a school-boy's lesson; burdensome or disagreeable employment: V. to assign a definite amount of employment or labor; to require to do; to burden with employment or labor; in *OE.*, to tax. TASK'ING, imp. TASKED, pp. *tâskt.* TASK'ER, n. *-ĕr*, one who tasks. TO TAKE TO TASK, to reprove; to reprimand. TASKMASTER, one who imposes or assigns oppressive labor to others. TASKWORK, work imposed or done as a task; work done by the job; piece-work.

TASMAN, *tâs'mân*, ABEL JANSZEN: probably 1600–44; b. Hoorn, Holland: explorer. On orders from the gov.gen. of the Dutch E. India Co., to circumnavigate Australia, he left Batavia 1642, Aug. 14, and Nov. 24 following discovered an island which he named Van Diemen's Land, in honor of the gov.gen., but which is now known, named from the discoverer, as Tasmania. In Dec. he discovered the island of New Zealand; 1643, Jan. 6, the Friendly Islands; and Feb. 6 the Fiji Islands. He returned to Batavia 1643, June 15; published an account of his voyage; and 1644, Jan. 29, started on a voyage to New Guinea—an expedition of which nothing was ever heard afterward.

TASMANIA. *tăz-mā'nĭ-a,* formerly VAN DIEMEN'S LAND: large island in the s. Pacific Ocean, 40° 40′—43° 40′ s. lat., and 144° 30′—148° 30′ e. long.; s. of, and separated from Australia by Bass's Strait; greatest length n. to s. 170 m.; greatest breadth e. to w. 160 m.; area, with about 50 adjacent islands, 26,375 sq. m. T. is a Brit. colony; cap. Hobart (q.v.). (pop. [1901] 24,655); other towns are Launceston (q.v.), Georgetown, Longford, New Norfolk, and Beaconsfield.

Pop. of T. (1854) 64,874; (1871) 99,328; (1883) 126,220—66,972 male, 59,248 female; (1891) 151,480; (1901) 172,475. The majority are native born.

Physical Features.—The island, mountainous and well watered by rivers, has much beautiful scenery, and is much more like England than are the other Australian colonies. Its s e. coast is deeply indented by the estuaries of the Derwent and Huon, Storm Bay, the inlet of Pitt Water, and Frederick Henry Bay: the last is protected on the s.e. by Tasman's Peninsula, reserved as a penal settlement for the colony. The chief indentations on the w. coast are Macquarie Harbor (formerly a penal settlement, now uninhabited,) and Port Davey. On the e. coast are Oyster Bay, between Freycinet's Peninsula and the mainland; and Spring Bay, sheltered on the e. by Maria Island. On the n. coast, besides the estuary of the Tamar, are numerous smaller harbors and rivers, accessible to vessels of 50 to 300 tons. The scenery is bold and mountainous, varied by deep, narrow valleys, extensive undulating tracts, and open plains. Among the principal mountains are Ben Lomond (5,010 ft.), Cradle Mount (5,069 ft.), Ironstone Mount (4,736 ft.), Mount Barrow (4,644 ft.), Mount Wellington (4,166 ft.), with many others above 4,000 ft. Embosomed among the central mountains, at an average height of about 3,000 ft., are numerous lakes, with united area of about 170 sq. m., which feed the greater part of the rivers draining the s.e. slope of the island. Except the reclaimed lands, the basaltic plains, and limited tracts unfavorable to forest growth, the whole island is wooded. The vast forests of the w. portions of the n. and s. coasts are extensively utilized for timber, and in the former, the rich heavily-timbered lands are being rapidly reclaimed. But the major part of the w. half of the island is uninhabited, its soil, climate, and inaccessible position offering little inducement to the settler.

Geology and Mineralogy.—The bed-rocks of the w. districts, from Bass's Strait to Southwest Cape, consist of vast bands of slates, schists, and quartz rock, belonging to the Azoic or Metamorphic series. Next are Lower Paleozoic slates, with conglomerates and dark compact limestones, the latter highly charged with Silurian fossils. Unconformably upon the upturned edges of these rocks lie Upper Paleozoic sandstones, mudstones, limestones, and conglomerates, also traversed by dikes and masses of greenstone and basalt, and with these rising 4,000 ft. above sea-level. In the s.e. districts, from the South Esk river on the n. to the Huon on the s.w., the lower rocks are en-

tirely absent, or concealed beneath the Upper Paleozoic beds. In the n.e. district, the lower rocks again appear, associated with granite and greenstone, and occasionally traversed by dikes and veins of true auriferous quartz. Here, again, they are overlaid by Upper Paleozoic rocks, extensively denuded, and exposing seams of coal 2 to 14 ft. thick, at various elevations. Tertiary rocks are sparingly distributed. At the mouth of the river Inglis, on the n. coast, are beds of whitish freestone, attaining in places a thickness of 120 ft., and containing recent shells, with extinct species of *Trigonia*, *Terebratula*, *Cypræa*; *Voluta*, etc. Tertiary lignites are found in the sandy clays of the valleys of the Derwent and Tamar, with impressions of leaves of unknown trees and plants. Over the greater part of the basin of the South Esk, comprising an area of more than 1,000 sq. m., are extensive deposits of clays, sands, and quartz drift. No very distinct traces of glacial action have been observed.

The crystalline rocks are everywhere present in great variety. In 1880, the value of the gold (alluvial and drift) produced was nearly a million dollars. Silver and antimony have been found in the gold drifts, and very rich deposits of tin began 1872 to be worked at Mount Bischoff, the richest tin mine in the world, which yielded 1,050 tons of ore in 1880, Jan.—June. Copper and galena occur. Red and brown hæmatites, containing large percentage of iron, occur on the n. coast in large masses and lodes: in 1880 there were raised 3,987 tons of ironstone; and ironworks on an extended scale are in operation. Coal is worked in several parts of the island. A large lode of bismuth was discovered 1875. The older limestones yield fine varieties of marble; and excellent building stone is obtained from the greenstones, basalts, and Paleozoic sandstones.

Botany.—The flora of T. has been fully described in the botany of the antarctic voyages by Hooker and others. The majority of the species are common to T. and Australia. The most widely diffused genera are the Eucalyptus and Acacia, the former yielding the ordinary timber of the colony. The Blue Gum (*Eucalyptus globulus*) reaches a height of 350 ft., with corresponding girth. The Black-wood (*Acacia melanoxylon*) and the Huon Pine (*Dacrydium Franklinii*) also yield valuable timber, which, with the hard-woods from the Eucalyptus, is exported to neighboring colonies. A species of Beech (*Fagus Cunninghamii*), locally known as the myrtle, very abundant in parts of the island, produces a highly valuable timber. All the common fruit-trees and culinary vegetables of England have been introduced, and grow with luxuriance.

Zoology.—Of the thirty species of mammals, one-half belong to the subclass *Aplacentaria*, comprising the *Marsupiata* (kangaroo, wallaby, opossum, wombat, etc.) and two species of the singular order *Monotremata* (Ornithorhynchus and Echidna). Among marsupial animals peculiar to T., the chief are the Thylacine (*Thylacinus cynocephalus*) and the Tasmanian Devil (*Dasyurus ursinus*),

both sometimes destructive to sheep. The skin of the kangaroo is prized for leather, and there is always a market for opossum fur. Whales and seals, formerly very abundant on the coasts, are now rare; though whaling is still extensive in the adjacent seas. The birds of T. have been admirably described by Gould: the majority are identical with Australian species. A species of puffin (*Puffinus brevicaudus*), locally known as the mutton-bird, frequents some of the islands in Bass's Strait in countless numbers, and many thousands are annually slaughtered for their oil, and for food by the half-caste islanders. Fish are plentiful in the seas and rivers, the best being known by the local name of trumpeter, and reaching a weight of 40 lbs. There are 13 species of snakes, most of which are venomous.

Climate, Soil, Produce, etc.—The climate of T. is fine and salubrious. From observations at Hobart Town, through 20 years, the extreme of heat appears to be 105°, and of cold 29·8 F. The mean temperature of the hottest month (Jan.) is about 63°, and of the coldest (July) 45°, and of the whole year about 54°. In some parts of the island, the temperature, even in winter, rarely sinks to 45°. Snow seldom falls in the settled district, and does not lie on the ground except on the high table-lands of the interior. The average annual rainfall at Hobart is 21·52 inches, and the average for the rest of the island about 35 inches, except in the w. country and the highlands, where a fall of 75 inches has been registered in a year.

The agricultural lands may be divided into three classes —alluvial deposits, tertiary clays, and loamy soils, derived from decomposition of different kinds of basalt. In their virgin state, some are marvellously productive. On new land, 100 bushels of oats, 70 bushels of wheat, and 15 tons of potatoes per acre, are not unusual crops. The fertility of the soil has encouraged slovenly farming: in many instances, the land has been cropped with wheat and oats for more than 30 years without any application of manure, or any rest except an occasional summer fallow. The open pastoral lands are admirably adapted for sheep: the wool from some of the larger establishments brings the highest price in the London market. The extent of alienated land is over 4,000,000 acres, of which about 233,000 are cultivated. The chief crops are wheat, oats, barley, potatoes, peas, and hay; also hops. Fruit of all kinds is largely grown and exported, and fruit-preserving is an important industry. In 1902 44,084 acres were in wheat, and the yield was 963,662 bushels. The exports, of which wool is the chief, had (1901) a value of £2,945,757, imports, £1,969,199. There are breweries, tanneries, soap-works, flour-mills, agricultural-implement works, and coach works. The protective tariff of Victoria, with the consequent loss of market, is a hindrance to the prosperity of T. In 1880 the colony possessed 207 sailing-vessels of 18,820 tons, and 15 steamers of 4,590 tons; in 1901, 154 sailing vessels of 8,952 tons and 53 steamers of 8,098 tons. There are 682 m. of railway.

Administration.—Since the passing of the 'Constitutional Act' 1854, the governing authority has been vested in a parliament, consisting of the gov. as the queen's representative, and two elective houses, the legislative council (1903) of 18, and the assembly of 38 members: freehold or rental, of a certain annual value, is a requisite qualification for voters.

The land laws are liberal. Any immigrant who has paid the passage of his family may demand 30 acres for himself, 20 for his wife, and 10 for each of his children. The average price paid (1880) for agricultural land was about £1 6*s.* per acre. Pastoral land may be had for 5*s.* an acre.

The revenue of T. (1890) was $3,661,062; expenditures $3,492,415; imports $9,221,908; exports $7,226,781; and public debt $24,392,583. The estimates for 1902 were, revenue £728,000, expenditures £850,000.

Religion and Education.—There is now no parliamentary grant for support of religion, though formerly £15,000 a year was divided among the religious denominations according to their respective numbers at the census. By a return 1901, there were: Church of Eng. 83,812; Rom. Cath. 30,314; Presbyterians 11,523; Wesleyans 24,961; Cong. 5,544; Baptists 4,330; Jews 107. The higher branches of education are under a council, the lower under a board: and public instruction is carefully and liberally fostered. In the beginning of 1901 there were 22 superior schools or colleges, 338 public elementary schools, 215 private schools, 2 technical schools and a university with 53 students. Of the entire population 34,872, or 20 per cent. are unable to read and write. There are 43 pub. libraries and mechanics' insts.; 7 daily, 5 weekly, 1 tri-weekly and 7 monthly periodicals.

Aborigines.—The number of the aborigines at the first colonization of T. has been variously estimated, but probably at no time exceeded 3,000. There were several tribes occupying distinct parts of the island, and differing in dialect and customs; but of generally uniform type more nearly allied to the Negritos of New Guinea than to the aborigines of Australia. The average height of the men was from 4½ to 5½ ft.; of the women, considerably less. Color bluish black; the facial angle 75° to 80°; eyes dark brown, with jet-black pupils; hair sometimes lank, but generally crisp or woolly; forehead high and narrow; limbs lean and muscular; feet flat, and turned inward. Polygamy appears to have been tolerated: the women performed all menial duties, and were specially charged with that of carrying fire from place to place, when the temporary encampment was broken up. Their usual shelter was constructed of boughs, but traces of rude huts have been observed. In summer they went entirely naked, at other times wearing coverings made from the skins of the kangaroo and opossum, which formed their chief food. The coast tribes, at certain times of the year, lived almost exclusively on shell-fish, and the remains of their feasts have often been mistaken for recent

marine deposits. No traces of cannibalism were observed. Their only weapons were the spear and waddy, a wooden club about 2 ft. 4 inches in length. The early relations between the settlers and aborigines were friendly; but as the latter were gradually dispossessed of their favorite hunting-grounds, they became inveterately hostile. For many years the unequal struggle continued, until their numbers were reduced to a few hundreds. In 1831 Robinson, a builder of Hobart Town, undertook to conciliate the surviving remnants with a view to their removal to Flinders Island; and this he accomplished, after four or five years of self-denying labor; but in spite of all the care bestowed on these unfortunate people, their numbers rapidly decreased, and only 45 remained when the settlement was removed 1847. There were 1865 only six remaining, and the last died 1876. See J. Bonwick's *Lost Tasmanian Race* (1884).

History.—The island was discovered by Tasman (q.v.) 1642, Dec. 1, and named by him Van Diemen's Land, in honor of his patron, then gov. of the Dutch possessions in the E. Indies. Partial surveys and explorations were made by English and French navigators 1777–1802. In 1803 Lieut. Bowen was dispatched from Sydney with a few soldiers and convicts to form a settlement in s. T., which was finally fixed on the spot where Hobart now stands. In 1804 a settlement was formed near the mouth of the Tamar, but was removed 1806 to the spot now occupied by the town of Launceston. From 1817 began rapid increase of free settlers, who received grants of land in proportion to the capital which they brought, and were subsequently aided in clearing and cultivating their estates by the assignment of convicts as their servants. In 1825 T. was declared independent of New South Wales.

The colony was for many years agitated by the question of the disposal and management of the convicts, who had become a prominent and formidable element in the community. At last, 1853, transportation to T. and New South Wales was abandoned by the Brit. government. The abolition of transportation, and the consequent cessation of a vast imperial expenditure, produced depression in trade, especially in the s. districts. It is not surprising that the great body of the colonists, instead of setting themselves manfully to turn the true and natural resources of the country to the best account, have rather looked for prosperity to some great discovery of rich gold-fields, or some gigantic works under the auspices of government. The rich lands of the n. coast offer industrious settlers a field practically inexhaustible.—Fenton's *History of T.* (Hobart 1884).

TASMANIAN, n. *tăs-mā′nĭ-ăn:* a native or inhabitant of *Tasmania* or Van Diemen's Land: ADJ. of or pertaining to Tasmania

TASMANNIA, *tăs-măn'nĭ-a:* genus of shrubs of nat. order *Magnoliaceæ. T. aromatica,* an evergreen bush of Tasmania, grows in the richest soils on the margins of rivers and in shady ravines, sometimes forming extensive thickets. Every part of the plant is highly aromatic and pungent. The fruit is occasionally used as pepper.

TASSEL, n. *tăs'sl* [OF. *tassel,* a fastening—from mid. L. *tassellus,* a fastening for a mantle—from L. *taxillus,* a small die; *talus,* a die—*tassel* being originally a button of squared bone]: a pendent ornament, consisting of a bunch of silk or other material attached by a cord to the corners of a cushion, etc.; a silk ribbon sewed to a book, to be put between the leaves as a mark for reference. TASSELLED, a. *tăs'sld,* furnished or adorned with tassels.

TASSEL, n. *tăs'sl,* or TARSEL, n. *târ'sl,* or TERCEL, n. *tĕr'sl* [OE. *tiercel*—from F. *tierce,* a third, so named because a third less than the female (see TIERCE)]: the male of the goshawk; in *prov.* and *OE.,* a silly person: ADJ. pertaining to; silly. TASSEL or TERCEL GENTLE, *ter'sĕl gĕn'tl,* the trained male of the goshawk, specially appropriated to the use of princes in their pastime of falconry.

TASSISUDON, *tăs-sē-sō-dŏn':* town, cap. of Bhotan (q.v.), on the right bank of the Godadda, an affluent of the Brahmaputra, lat. 27° 30′ n. Many of the inhabitants are employed in manufacturing paper and in making brass images and ornaments for their places of worship.

TASSO, *tăs'ō,* It. *tâs'so,* BERNARDO: Italian poet: 1493, Nov. 11—1569, Sep. 4; b. Bergamo; father of the illustrious Torquato T. Both by his father's and by his mother's side, he was connected with the ancient family of the Tassi. His uncle, Luigi Alessandro, Bp. of Recanati, took charge of his education, and he became a fine classical scholar. Like his son, he was exceedingly fond of the patronage of noble lords and the smiles of noble ladies. Guido Rangone, gen. of the pontifical forces, intrusted him with several missions, among others to the Prince of Salerno, who appointed him his sec. In 1539 he married, at Salerno, a young lady of Sorrento, Porzia de' Rossi, who had merit as well as beauty and fortune, and who became the mother of Torquato. After the fall of the Prince of Salerno, Guidubaldo, Duke of Urbino, and Gugielmo, Duke of Mantua, sought to attach the poet to their court. The latter succeeded, and named him gov. of the city of Ostiglia, where he died.

T.'s principal writings are: *Rime* (Ven. 1531); *I tre Libri degli Amori* (Ven. 1537); *Ode e Salmi* (Ven. 1560); *L'Amadigi, Poema* (Ven. 1560); and *Il Floridante, Poema* (Mant. 1587). Of these the principal is *L'Amadigi* (Amadis), admired for sweetness and elegance of language, and for beauty of description.—For a good idea of the politics and literature of the time, see Seghezzi's ed. of his *Lettere* (3 vols. Padua 1733–51), with biographical notice

TAS'SO, TORQUATO: one of the greatest poets of Italy: 1544, Mar. 11—1595, Apr. 25; b. at Sorrento in Naples; son of Bernardo T. (q.v.). His earliest education was received from the Jesuits. During his childhood, T.'s father was an exile, but the affectionate solicitude of his mother well supplied the want of paternal care. In 1554 he went to Rome to join his father, and left his mother (whom he never again saw) in a convent at Naples. At Rome, and subsequently at Bergamo, Urbino, Pesaro, and Venice, he continued his studies. He assisted his father in copying, correcting, and even in completing his poem *L'Amadigi*, though only 16 years of age. No wonder old Bernardo T. was delighted at the promise shown by his son, and prophesied greatness for him. Later, however, sad experience of the miseries of a poet's life induced him to send his son to Padua to study jurisprudence; but the youth, remaining at Padua a year, wrote *Rinaldo* (Venice 1562), a poem in 12 cantos, the hero of which is the son of Aymon, and cousin of Roland it belongs in the class of heroic romances. After the first burst of anger was over, Bernardo forgave his son for following his example rather than his precept, and became prouder of T.'s genius than ever. T. then betook himself to the Univ. of Bologna to study philosophy, and is said to have distinguished himself by facility in the discussion of the most elevated and abstract themes. On leaving Bologna, he spent some time with friends at Castelvetere, Modena, and Correggio, but returned to Padua at the request of his friend Scipio de Gonzaga, afterward cardinal, who had established a literary academy there, of which T. became a member. It was during this second residence at Padua that he conceived the idea of his great work, *Gerusalemme Liberata*, a heroic record of the conquest of Jerusalem by the Crusaders under Godfrey de Bouillon. Lamartine describes the mingled motives of the poet: 'Urged by piety no less than by the muse, Tasso dreamed of a crusade of poetic genius, aspiring to equal, by the glory and the sanctity of his songs, the crusades of the lance he was about to celebrate.' The same critic goes on to observe, in allusion to the less noble passion for the applause of courts that marked the poet: 'The names of all the noble and sovereign families of the West would be revived in this epic catalogue of their exploits, and would attract to the author the recognition and favor of the great. . . . Finally, the poet was himself a knight, noble blood flowed in his veins, to celebrate warlike deeds seemed, as it were, to be associating his name with those of the heroes who had performed them on the field of battle.' Bernardo heard of his son's design with exulting joy, and blessed Heaven for making Torquato a greater genius than himself. Meanwhile (1565), T. had been introduced by Cardinal Luigi d'Este (to whom he had dedicated the *Rinaldo*) to his brother, Alfonso II., sovereign Duke of Ferrara. Here for a time he was happy. Young, handsome, courteous, and with that proper tinge of melancholy in his disposition that is often a charm for women, he soon became a favorite with the beauties of the

court, and proceeded to paint his *Armida* and *Herminia* almost without effort. In 1570 T. visited France and spent a year, gaining the friendship of Charles IX. To attribute his subsequent miseries and madness to a presumptuous passion for Leonora, sister of the Duke of Este, which was first encouraged, then repulsed, and finally punished with imprisonment, is utterly at variance with the well-known facts, though the errors of traditions have been so specious as to impose on illustrious men. T. courted, platonically and otherwise, various ladies of the court—a pretty chambermaid even was not beneath his notice; but there is nothing to show that he lifted his eyes to the sister of his sovereign, or that such a suspicion was ever harbored by the lady herself or her brother. In truth, his madness was connected in its origin more closely with his poetry than with his loves. Having finished his great epic about 1575, he sent a copy of it to a society of scholars, critics, and churchmen at Rome, to get their opinion of it. It would have been far better had he published the poem at once, without placing it at the mercy of critics who were delighted to have the opportunity of finding fault before the public was in a position to praise. The critics would then have been forced to swell the chorus of general admiration. T. was tortured by their waspish comments, and, with pitiable suffering, proceeded to make his work more agreeable to his incapable judges. Gradually a morbid melancholy, the result of worry acting on a naturally suspicious and irritable temper, overpowered his reason; the spites and jealousies never absent from a pleasure-loving court increased his mental disorder; he believed that invisible persecutors had denounced him to the Inquisition as a heretic. In vain Alfonso and his sisters tried to calm his perturbation, and even induced the Inquisition to write him a reassuring epistle. His paroxysms increased in violence. Finally, 1577, June, he drew his dagger in the apartments of the Duchess of Urbino, to stab a domestic whom he took to be one of his secret enemies; and Alfonso had him confined in his palace and at Belrignardo for his health's sake. Next month he made his escape, under the delusion that the duke meant to kill him, and fled across the Abruzzi to his birthplace, Sorrento, where he took refuge with his sister. The air of his native place quickly restored him to health; but no sooner had he recovered than he began to yearn for the old excitements, begged Alfonso to take him back to court; and when that prince dryly informed him that he might return if he would submit to medical treatment for his malady, T. greedily availed himself of the permission; and was soon as wretched as before. Believing himself neglected and insulted, he broke into violent abuse. A new flight ensued, this time toward n. Italy. The unhappy poet wandered at last half-naked into the city of Turin, where he was humanely received by the Marquis d'Este, brother of Alfonso. After some time, he again ventured to return to Ferrara (1579), but only to lose his mental balance almost as soon as he breathed its noxious air. Alfonso shut him up in the asylum of Santa

Anna in Ferrara, in which he remained 1579–86, seven years, suffering from confinement. The duke, at the request of the Prince of Mantua, Pope Sixtus V., and others, released him 1586, July 5. During the remainder of his life, T. lived chiefly at Naples and Rome. Almost the last incident of his career was his intended public coronation on the Capitol: Pope Clement VIII. had invited him to be crowned with bays as Petrarch had been, on the steps of the Capitol. The excitement was too much for his ruined frame: a slow fever seized him; he was removed to the convent of Santo Onotrio, and there, before the laurel could be worn by him or the pension received, he died after a brief illness.

T.'s *Gerusalemme Liberata* is one of the great Italian poems: it opened a new field—the poetry of sentiment—in musical verse, and with graceful pathos in its languishing cadences. Besides *Gerusalemme Liberata*, transl. by Fairfax (1600), Hooke, Hoole, Hunt (1818), Smith (1851), Griffiths (1863), etc., T. wrote a great number of works in verse and prose. In 1573 he produced his *Aminta*—a pastoral drama, one of the first and most successful of its kind, whose striking beauty led to innumerable imitations; *Rime, insiemi con altri Componimenti* (1581); *Dialoghi e Discorsi* (1587); *Lettere Familiari* (1588); *Rime* (1592–1593); and *Gerusalemme Conquistata* (1593), the latter lacking all the grace and power of his earlier cognate work. A complete ed. of his works appeared at Pisa 1832, 33 vols. See Hasell's *T.* (1882).

TASTE, v. *tāst* [It. *tastare;* OF. *taster*, to handle, to feel by the sense of touch—from a supposed mid. L. *taxĭtārĕ*, to touch often—from L. *tangĕrĕ*, *tactum*, to touch: Ger. *tasten*, to feel or grope]: to perceive and distinguish by means of the tongue or palate; to have perception of the flavor of; to test by the tongue; to try the relish of; to obtain pleasure from; to experience; to undergo; to have a particular flavor or relish; to eat or drink a little; to have a particular quality or flavor; to enjoy sparingly; to take to be enjoyed: N. act of tasting; the peculiar sensation excited by bringing a substance into contact with the tongue and palate, differing according to the substance; the sense by which we perceive the relish of a thing (see below): relish; flavor; a little eaten, or drunk, or used, as a specimen; nice perception; judgment; discernment; the faculty of discerning beauty, order, or whatever constitutes excellence in human performances; intellectual discernment; manner, style, or choice, either good or bad, with respect to what is pleasing; in *OE.*, essay; trial; experiment. TAST'ING, imp.: N. act of perceiving by the tongue; the sense by which we distinguish savors. TAST'ED, pp.: ADJ. having a particular relish. TAST'ABLE, a. *-ă-bl*, capable of being tasted; savory. TASTE'FUL, a. *-fŭl*, having a high relish; savory; possessed of a good taste; having a pleasing style or manner, as in dress or in doing a thing. TASTE'FULLY, ad. *-lĭ*. TASTE'FULNESS, n. *-nĕs*, the state or quality of being tasteful. TASTE'LESS, a. *-lĕs*, without taste; having no power of giving pleasure. TASTE'LESSLY, ad. *-lĭ*. TASTE'LESSNESS, n. *-nĕs*, the state of being tasteless; want of relish; insipidity. TAST'ER, n. *-ér*, one who tastes; one who judges wines or teas by tasting them; a small instr. used in sampling cheese, ham, wine, or the like. TAST'Y, a. *-ĭ*, *familiarly*, palatable; displaying nice perception of excellence; in conformity to the principles of good taste; elegant; fine. TAST'ILY, ad. *-lĭ*, with a good manner and style of doing.—SYN. of 'taste, v.': to try; feel; relish; approve; eat;—of 'taste, n.': gustation; sensibility; perception; savor; relish; flavor; goût.

TASTE: one of the senses—that by which is perceived the flavor or relish of substances. The principal seat of the sense of taste is the mucous membrane of the tongue, in which dissection reveals a *cutis* or *chorion*, a *papillary structure*, and an *epithelium*. Of the *cutis*, it is sufficient to remark that it is tough, but thinner and less dense than in most parts of the cutaneous surface, and that it receives the insertions of the intrinsic muscles of the tongue, which will be described when that organ is treated of generally. The *papillary structure* differs from that of the skin in not being concealed under the epithelium, but in projecting from the surface like the villi of the digestive canal, thus giving the tongue its well-known roughness. The *Epithelium* (q.v.) is of the scaly variety, as on the skin, but is much thinner on the tongue than on the skin: it is most dense about the middle of the upper surface of the tongue, and here, in disordered digestion, is the chief accumulation of *fur*, which is simply a depraved and overabundant

formation of epithelium. The *papillæ* on the surface of the tongue are either *simple* or *compound*. The former, which closely resemble those on the skin, are scattered over the whole surface of the tongue in parts where the others are not, and they likewise participate in the formation of the compound papillæ, which, from their forms, are respectively termed (1) the *circumvallate* or *calyciform*, (2) the *fungiform*, (3) the *conical* or *filiform*

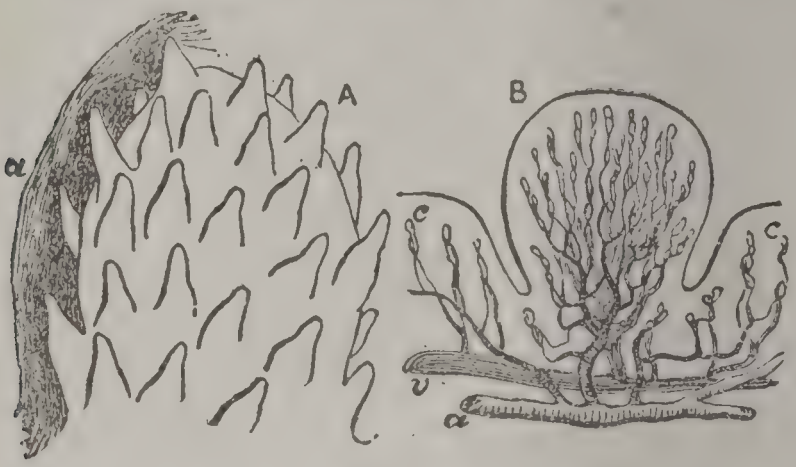


Fig. 1:

A, *Fungiform papilla*, showing the simple papillæ on its surface; and, at *a*, the epithelium investing them (magnified 35 diameters). B, a similar papilla, with the capillary loop of its simple papillæ injected: *a*, artery; *v*, vein. Around the base there is often a groove, which is here shown; as also are the capillary loops, *c*, *c*, of two of the neighboring simple papillæ (magnified 18 diameters.)

The *circumvallate* papillæ, eight or ten in number, are situated in the form of a V at the base of the tongue: their function seems to be to secrete mucus, as well as to take part in the act of tasting. They consist of 'a central flattened projection of the mucous membrane of a circular figure, and from $\frac{1}{20}$ to $\frac{1}{12}$ of an inch wide, surrounded by a tumid ring of about the same elevation.' They are shown in the figure of the surface of the tongue (see

Fig. 2.—Various Forms of Conical Compound Papillæ:

a, *b*, *c*, provided with the stiffest and longest epithelium, and the simple papillæ much acuminated; *d* approximates to the fungiform, and *e* and *f* to the simple papillæ. (Magnified 20 diameters.)

TONGUE). The *fungiform* papillæ are scattered over the surface in front of the circumvallate papillæ, and about the sides and apex. They are usually narrower at the base than at the apex, where they are about $\frac{1}{30}$ of an inch in diameter. They are covered with simple or secondary papillæ, and their investing epithelium is so thin that

the blood circulating in them gives them a red color, not seen in the conical papillæ among which they are distributed. They contain nerves terminating in loops. The shape of the *conical* or *filiform* papillæ is indicated by their names; and even if they take little part in the sense of taste directly, it is convenient to describe them here. Their average length is about $\frac{1}{10}$ of an inch. (For their structure, see the accompanying diagrams.) They terminate in long pointed processes, which are bathed by the mucus of the mouth, and are capable of moving in any

Fig. 3:

A, vertical section near the middle of the dorsal surface of the tongue, showing the basement membrane, on which lie *a*, *a*, fungiform papillæ; *b*, *b*, filiform papillæ, with hair-like processes; *c*, *c*, similar papillæ devoid of these progesses. B, a filiform compound papilla, magnified 300 diameters: *a*, artery; *v*, vein; *c*, capillary loop; *d*, a secondary papilla deprived of *e*, epithelium; *f*, hair-like processes at the apex.

direction, though they are generally inclined backward. Some of the stiffer of these epithelial processes inclose minute hairs, of which several forms are depicted by Todd and Bowman – *Physiological Anatomy*. These authors surmise, on structural grounds, that the filiform papillæ 'can scarcely share in the reception of impressions which

depend on the contact of the sapid material with the papillary tissue. The comparative thickness of their protective covering, the stiffness and brush-like arrangement of their filamentary productions, their greater development in that portion of the dorsum of the tongue which is chiefly employed in the movements of mastication, all evince the subservience of these papillæ to the latter function rather than to that of taste; and it is evident that their isolation and partial mobility on one another must render the delicate touch with which they are endowed more available in directing the muscular actions of the organ. The almost manual dexterity of the tongue in dealing with minute particles of food is probably provided for, as far as sensibility conduces to it, in the structure and arrangement of these papillæ.' Notwithstanding the difference in their outward form and mode of arrangement, the simple papillæ, which have been detected as scattered over the whole dorsum of the tongue (though concealed under the common sheet of epithelium), and those clothing the circumvallate and fungiform papillæ, do not seem to present any structural difference; and their epithelium, which is very thin, readily permits the transudation of sapid substances dissolved in the mucus of the mouth. With regard to the use of the singular configuration of the circumvallate and fungiform papillæ, 'it may be conjectured that the fissures and recesses about their bases are designed to arrest on their passage small portions of the fluids in which the sapid materials are dissolved, and thus to detain them in contact with the most sensitive parts of the gustatory membrane.'

There has been much discussion regarding the precise seat of the sense of taste and the true nerves of taste. Although the surface of the tongue is the special seat of gustative sensibility in man, the sense of taste is not restricted to that organ, being diffused, in less degree, over the soft palate, the arches of the palate, and the fauces. Moreover, the gustative sensibility varies on different parts of the surface of the tongue. It is generally allowed that acute taste (say the writers above quoted) 'resides at the base of the tongue, over a region of which the circumvallate papillæ may be taken as the centre, and also on the sides near the base. These parts are supplied solely by the glossal twigs of the glosso-pharyngeal nerves. Some writers, amongst whom are Valentin and Wagner, believe the middle and anterior parts of the dorsum of the tongue to be usually incapable of appreciating flavor; while numerous others hold the contrary opinion, with which our own careful and repeated experiments, on other persons as well as ourselves, quite accord. Sour, sweet, and bitter substances applied to the sides, and especially to the tip of the protruded tongue, we find to be at once distinguished; though when placed on the middle of the dorsal region they make little or no impression till pressed against the roof of the mouth. This region of the tongue is supplied almost solely by the lingual branch of the fifth nerve. We conclude generally, with regard to the tongue that the

whole dorsal surface possesses taste, but especially the circumferential parts, viz., the base, sides, and apex.' The investigations of Todd and Bowman further show that the soft palate and its arches are endowed with taste in some persons, but not universally, while they got no evidence in any case of gustative sensibility on the pharynx, gums, or elsewhere. The soft palate and its arches are supplied by palatine branches from Meckel's ganglion, and sparingly by the glosso-pharyngeal nerves. From (1) evidence afforded by the anatomical distribution of the nerves to parts enjoying the sense of taste, (2) evidence of experiments, in which the various nerves of the tongue were divided, (3) evidence afforded by disease, it may be safely inferred that the glosso-pharyngeal and the lingual branches of the fifth pair of nerves respectively participate in the sense of taste; and there is reason to attribute a share also to the palatine branches of the fifth.

Impressions of taste may be produced by a mechanical or chemical excitement of the gustatory nerves. A quick light tap of the finger on the tip of the tongue causes a taste, sometimes acid, sometimes saline, which lasts for several seconds; and galvanism acts similarly. If the surface of the tongue, near the root, be touched with a clean dry glass rod, or a drop of distilled water be placed on it, a slightly bitterish sensation is produced; and if the pressure be continued, a feeling of nausea ensues. If a small current of cold air be directed against the tongue, it excites a cool saline taste like that of saltpetre. From experiments by E. H. Weber, it appears that one of the conditions requisite for due exercise of the sense of taste is a temperature not departing far from the natural standard: thus, if the tongue be immersed for a minute in water at a temperature of 125°, or in iced water, the taste of sugar, etc., is no longer perceived. In order that sapid bodies should cause taste, it is necessary that they should be dissolved, and made to permeate the tissue of the papillæ, so as to come in contact with their nerves. This is proved by the two following facts: 1st, that every substance, solid, fluid, or gaseous, which possesses a distinct taste, is more or less soluble in the fluids of the mouth, while substances perfectly insoluble are recognized only by the sense of touch; and 2d, that if the most sapid substance be applied in a dry state to a dried part of the surface of the tongue, no sensation of taste is excited. Bitters and acids appear to be the most sapid bodies, since they may be diluted to a greater extent than any other known substances without ceasing to excite sensations of taste: thus, according to Valentin, 1 part of extract of aloes, or of sulphuric acid, in 900,000 of water, and even 1 part of sulphate of quinia in 1,000,000 parts of water, may, with ease, be distinguished from perfectly pure water. 'The contact of a sapid substance,' says Dr. Carpenter, 'much more readily excites a gustative sensation when it is made to press upon the papillæ, or is moved over them. Thus there are some substances whose taste is not perceived when they are simply applied to the central part of the dorsum of the

tongue, but of whose presence we are at once cognizant by pressing the tongue against the roof of the mouth. The full flavor of a sapid substance, again, is more readily perceived when it is rubbed on any part of the tongue than when it is simply brought in contact with it, or pressed against it. Even when liquids are received into the mouth, their taste is most completely discriminated by causing them to move over the gustative surface: thus, the 'wine-taster' takes a small quantity of the liquor in his mouth, carries it rapidly over every part of its lining membrane, and then ejects it.'—*Principles of Human Physiology*, 6th ed., 621. Most sapid substances affect the nerves of smell to a greater or less degree, as they pass down the throat; and it is this compound of taste and smell that constitutes *flavor*. It is a common habit to hold a child's nose when he is taking a nauseous draught, with the view, as is supposed, of deadening the taste. The efficacy of the process depends on the exclusion of smell, and the reduction of the flavor of the medicine to its mere taste. The agreeable sensation produced by sipping good wine is due to what is termed its *bouquet*—i e., its flavor, or combined taste and smell. Some substances leave a taste in the mouth very different from that which they first produced. This *after-taste* is usually bitter; but in the case of one of the most bitter substances known, namely, tannin, it is sweet. This connection seems, in a degree, to correspond to the complementary colors in vision.

There can be no doubt that the sense of taste has for its primary object to direct us in the choice of food, to make the act of eating agreeable and to excite the flow of mucus and saliva, which aid the digestive process; and among the lower animals, the instinctive perceptions connected with this taste are much more remarkable than in man. As a general rule, it is found that those substances whose taste is agreeable are useful articles of food, and *vice versâ;* though there are well-known exceptional cases. Sir Henry Holland, in his *Medical Notes and Reflections*, observes that, in the majority of instances of actual illness, the desires of the patient as to food and drink may be safely complied with, even when some seeming extravagance of diet is suggested; and that, in the early stage of recovery from gastric fevers, he has seen many curious instances of such contrariety to all rule acquiesced in with manifest good to the patient. 'Dietetics,' he adds, 'must become a much more exact branch of knowledge before we can be justified in opposing its maxims to the natural and repeated suggestions of the stomach, in the state either of health or disease.'

TASTO, ad. *tăs'tō* [It., touch]: in *mus.*, a direction that the passage to which it is affixed is to be played in unison, without accompanying chords.

TATAR: see TARTAR 1.

TATARS, *tă'târz:* correct though not usual form for TARTARS (q.v.).

TATE, *tāt*, NAHUM: poet and dramatist: 1652–1715, Aug. 12; b. Dublin; son of the Rev. Dr. Faithful T. He was educated at Trinity College, Dublin. He removed to London, and 1692 he succeeded Shadwell as poet-laureate, and held that dignity till his death. His habits were improvident, and in the latter part of his life he resided within the precincts of the Mint at Southwark, then a privileged sanctuary for debtors. His writings include nine or ten dramatic pieces, *Panacea, or a Poem on Tea*, various birthday odes, and an elegy on the death of Queen Mary. He lived to write the first birthday ode for George I. But T. is best known by his metrical version of the Psalms, in conjunction with Dr. Nicholas Brady (q.v.), chaplain to King William and Queen Mary—which was attached to the Prayer-book, and came into general use in the Church of England, supplanting the older version made in the reign of Edward VI. by Sternhold and Hopkins.

TATHAM, *tăt'am*, WILLIAM: soldier and author: 1752–1819, Feb. 22; b. Hutton, England. In 1769 he emigrated to Va., engaging in mercantile pursuits. Prior to the revolution he was adjt. of militia against the Indians; was col. of cav. in the revolution; was admitted to the bar 1784; removed to N. C. 1786, and became a member of its legislature. In 1801–05 he was supt. of docks, London, Eng.; 1817–19 U. S. milit. store-keeper. He committed suicide at the Richmond arsenal.

TATIAN, *tā'shĭ-an:* one of the early apologists of Christianity against the pagan philosophers, and founder of a sect which, whether under his own name or under various other appellations derived from its peculiar tenets or practices, attracted considerable notice in the primitive ages: b. probably in Assyria conjecturally before 130; d. at unknown date, but prob. after 172. Having cultivated rhetoric and philosophy in various places, he came to Rome about 150, where he became disciple and friend of Justin the Martyr, and was by him converted to Christianity. He is known to have written many works, of which, however, only the *Apology* is preserved. The date of its composition is uncertain, but it was probably before the death of Justin 166. T.'s famous *Diatessaron*, the earliest attempt at a complete Harmony of the Gospels, was one of the lost works; but researches since 1877 have restored the work on the basis of Ephraem's gospel commentary—so far at least as concerns its main features. The *Diatessaron* is considered of high importance as testimony to the fact that in 160 the New Test. canon had not become finally established; to the fact that in 160 our four gospels had general prominence in the church, and that no other gospels had; to the fact that the fourth gospel held (160) a fixed place with the other three; and to the fact that, in the main and essentially, the text of our gospels was then the same as now, though about that time some alterations were beginning to be intentionally made. No trace appears in the *Apology* of the heterodox opinions of T.; and it is alleged by Tertullian that it was not till after the death of Justin that he fell into the errors to which he has given a name.

He then removed to the East, and is said to have established himself in Mesopotamia. Without entering into the details of T.'s peculiar opinions, it is enough to say that—especially in their moral aspect, and in their aim to develop a theoretic basis for a doctrine of entire renunciation of the world by Christians—they form the foundation of one of the great divisions of Gnosticism (q.v.). Starting from the common principle of dualism, and of the origin of matter from the evil principle, and its consequent evil nature, T., unlike the Egyptian Gnostics, held the necessity of overcoming the corrupt nature of man, and purifying it by abstinence and ascetic rigor. Accordingly, he reprobated marriage, and condemned all sensual indulgence. One of his 'opinions,' affirming the damnation of Adam, was peculiarly odious to the orthodox party. He condemned the use of wine so strongly as to forbid it even in the celebration of the Eucharist, in which his followers permitted only water to be used, whence they received the name of *Hydroparastatai* [from *hydor*, water, and *paristemi*, I present], and in Latin *Aquarii*. From their generally rigorous asceticism, they were called *Encratites* (q.v.) [from *engkratein*, to keep continent]. In their dogmatic views as to Docetism, the Demiurge, and Emanations, they differed little from other Gnostics of the Syrian school. T.'s doctrinal errors, though they necessitate his being classed with an abhorrent company, can largely be traced to his early pagan training in Greek and oriental philosophies, and had their home in his intellect rather than in his heart.—See GNOSTICS: MANICHÆANS: MYSTICISM.

TATIUS, *tā'shĭ-ŭs*, ACHILLES: one of the later Alexandrine authors, of whose life nothing is known. He was formerly thought to have lived in the 2d or 3d c.; but as he undoubtedly imitated the style of Heliodorus of Emesa, he cannot be placed earlier than the beginning of the 6th c. (see NOVELS). Suidas, who calls him Achilles Statius, says that he was originally a pagan, but was converted to Christianity, and rose to be a bishop. If this be true, the romance which has preserved the author's name, *Ta Kata Leukippen kai Kleitophōnta* (The Loves of Leucippe and Cleitophon), must have been composed in his pagan days, for it is in parts too licentious and heathenish to be the work of a Christian convert.

TATNALL, *tăt'nal*, JOSIAH: soldier and statesman: 1762–1803, June 6; b. Bonaventura, Ga. Though his family were tories, he joined the colonial army and served during the revolution. He became successively capt., col., and brig.gen. He was a member of the Ga. legislature, U. S. senator from Ga. 1796–99, and gov. 1801–2. He died at Nassau, New Providence, Bahamas.

TATTA, n. *tăt'tă* [Hind. *tatta*]: a frame or trellis of the fibre of cuscus-grass, hung before the open doors and windows of houses in India, and over which water is constantly sprinkled in order to cool the air; also spelled TATTY, TATTIE.

TATTA, *tât'tâ* (correctly, THATTA, *tât'tâ*): town of Sinde, on the right bank of the Indus, at the head of the delta of that river, 64 m. e. of Kurrachi. In former times, T. was a flourishing town, and manufactured fabrics of silk and cotton. The mosque of Shah-Jehan, built of brick, is now falling into decay. The vast cemetery of T. has an area of 6 sq. m., containing, it is calculated, at least a million tombs, and has room for not less than four millions.—Pop. of T. about 10,000.

TATTER, v. *tăt'tĕr* [Icel. *töturr*, a rag: Low Ger. *taltern*, tatters: Bav. *tattern*, to tremble, to shiver—the primary image being the fluttering of the torn fragments]: to rend or tear into rags. TAT'TERS, n. plu. *-tĕrz*, loose torn pieces hanging from a garment. TAT'TERING, imp. TAT'TERED, pp. *-tĕrd:* ADJ. torn; hanging in rags. IN TATTERS, in rags or loose pieces, as a garment.

TATTERDEMALION, n. *tăt-tĕr-dĕ-māl'yŭn* [Eng. *tatter*, a rag, and OF. *maillon*, long clothes]: a ragged dirty fellow; a ragamuffin.

TATTERSALL'S, *tăt'ĕr-salz:* famous mart in London, for sale of horses, so called from Richard Tattersall (d. 1795), groom to the second Duke of Kingston. It was established near Hyde Park Corner 1766, but was removed to Brompton 1865, Apr. Its racing subscription-room is a great rendezvous for patrons of the turf.

TATTING, n. *tăt'tĭng:* a kind of netting or lace made with strong soft cotton by means of a shuttle and pin; the process of making such netting.

TATTLE, n. *tăt'tl* [imitative of rattling gabbling talk, represented by the syllables *ta, ta, ta:* Low Ger. *tateln*, to gabble like a goose: Dut. *tateren*, to stammer]: idle trifling talk; chatter: V. to talk idly; to tell or communicate trifling idle stories; to blab; to speak much with little meaning. TAT'TLING, imp. *-tlĭng:* ADJ. given to idle talk; apt to tell tales: N. idle talk. TATTLED, pp. *tăt'tld.* TAT'TLER, n. *-tlĕr*, an idle talker. TAT'TLERY, n. *-ĭ*, idle talk or chat. TAT'TLINGLY, ad. *-tlĭng-lĭ.*

TAT'TLER: see SANDPIPER.

TATTOO, n. *tăt-tō'* [the beat of the drum is represented by various combinations of the syllables *rap, tap, tat*, or the like: F. *rataplan:* Sp. *taparapatan:* It. *tappata:* Dut. *taptoe*]: the beat of drum at night to warn soldiers to repair to their quarters. TO BEAT THE DEVIL'S TATTOO, *familiarly*, to drum idly and monotonously with the ends of the fingers on the table, etc., or similarly on the floor with the foot.

TATTOO, v. *tăt-tō'* [Tahitian, *tatau*, tattoo-marks—from *ta*, a mark]: to mark the skin, generally that of the face or arms, with figures, of various kinds, by means of punctures and a coloring substance: N. lines and figures made on the skin of the body, and afterward stained to render them permanent. TATOO'ING, imp.: N. act or operation of puncturing the skin and staining the spots with a colored substance; the lines and figures thus formed (see below). TAT'TOOED', pp. *-tōd':* ADJ. marked by stained lines or figures on the body.

TATTOOING, *tăt-tō'ing:* marking the skin with figures of various kinds, by means of slight incisions or punctures and a coloring matter. The term (of Polynesian origin) is said to be derived from a verb *ta*, to strike. T. is almost universal in the South Sea Islands, except where Christianity and civilization have put an end to it. The T. of the New Zealanders and other South Sea Islanders often covers the whole face, sometimes also the chest, arms, and other parts of the body, with elaborate patterns: it is performed in youth, and marks the transition from boyhood to manhood, like the assumption of the *toga virilis* among the ancient Romans. An instrument of bone, toothed on the edge, is applied to the skin, and struck with a piece of wood, having first been dipped in a thick mixture made by rubbing down charcoal with a little water. The marks which result are permanent, and appear black on a brown skin; though they are dark blue on the skin of a European. T. is, or has been, practiced in almost all parts of the world. It seems to be one of the practices prohibited to the Jews, Lev. xix. 28, 'Ye shall not make any cuttings in your flesh for the dead, *nor print any marks upon you*,' from which may be inferred its connection with the superstitions of the surrounding heathen. The Bedouin Arabs, the Tunguses, and other eastern tribes, many tribes of American Indians, and certain classes of the Japanese, practice it at the present day. Among the Bedouins it is a favorite mode of female adornment. Among the ancient Thracians it was distinctive of high rank. The ancient Britons also practiced it, and traces of it appear to have lingered in England till after the Norman conquest.

TAU, n. *taw* [Greek name of the letter *t*]: in *entom.* a species of beetle; a species of moth; a kind of fly: in *her.*, the cross of St. Anthony, called also the Tau Cross.

TAUCHNITZ, *towch'nĭts*, Karl Christoph Traug: German printer and bookseller: 1761–1836; b. Grosspardau, near Leipzig. Bred a printer, he began, 1796, a small printing business in Leipzig, to which he soon added publishing and type-founding, and which became one of the greatest establishments of the kind in Germany. In 1809 he began the issue of a series of editions of the classic authors, whose elegance and cheapness gave them a European circulation. By offering a prize of a ducat for every error pointed out, he was able to bring out, 1828, an edition of Homer of extraordinary correctness. He was the first to introduce (1816) stereotyping into Germany; and he applied it to music also, which had not been attempted before. In his latter years he stereotyped the Hebrew Bible, and the Koran in the original Arabic. On his death the business was continued by his son, Karl Christian Phil. T.—A nephew of the elder T., Christian Bernh. Tauchnitz, also set up a publishing establishment in Leipzig, combined with printing. Among the most noted of his undertakings is the well-known issue of 'British Authors' (begun 1842), of which more than 2,000 vols. have appeared. Ennobled 1860, T. was made one of the few Saxon life-peers 1877.

TAUGHT, v. *tawt:* pt. of TEACH, which see.

TAUGHT: a variant of tight; see TAUT.

TAULER, *tow'lĕr*, JOHANN: remarkable mystic writer and preacher: about 1300–1360, June 19; b. Strasburg. About 1308, renouncing a considerable fortune, he entered into the mendicant order of Dominicans: afterward studying theology in Paris, he showed at that early period a predilection for speculative and mystic writings, as the scholastic philosophy and the prevailing theology of the schools did not satisfy him. Notwithstanding this tendency, his predominating practical turn of mind led him, on his return to Strasburg, to preaching and pastoral duty; and in this he continued with zeal and undaunted courage, even when, in consequence of the excommunication which the pope had hurled against Emperor Ludwig, the country had fallen into dreadful distraction, and almost all the clergy in obedience to the interdict by the bp. of Strasburg had suspended worship. Although T. had come to middle life, and had had celebrity for several years as a preacher, so powerfully (it is said) was he influenced by a Waldensian, Nicholas von Basel, who visited him 1340, that he gave himself up for two years to ascetic exercises and devout contemplation (see FRIENDS OF GOD). Afterward he betook himself to vigorous exertions on behalf of the despised and oppressed people; and preached with wonderful power, inveighing against the avarice, ostentation, and selfishness of the laity as well as of the clergy; and, though not departing from the doctrines of the church, yet fearlessly exposing its abuses, not sparing even the pope. Thus it happened that, though he had indefatigably administered the consolations of religion in the midst of the horrors and desolation of the Black Death (q.v.), the bishop interdicted him from preaching, and he was obliged to quit his native town. He repaired to Cologne; but nothing further is known, either of his residence there or of his return to Strasburg, where, after a life full of toil, denial of self, and beneficence to others, he died, and was buried in his cloister. If not the greatest German preacher of the middle ages, T. certainly was the greatest of his own times. As his mysticism was in no wise passive, but aimed at rising above the sad condition of his times and the failings of the church by inward piety and a love self-denying but at the same time active, so his style, both in his preaching and in his devotional works, was lively, impressive, picturesque, and had altogether a practical direction. T. represents the highest and purest style of German mysticism (see MYSTICISM). Among his devotional works, the *Nachfolge des armen Lebens Christi* holds the first place. Whether the sacred hymns which bear his name really belong to him is doubtful. Of his writings and sermons, in which he always used the German language, many have been preserved in MS.; and since 1498 numerous editions have been published, but untrustworthy, and often translated into the dialect of the place where they happened to be printed. A careful translation into new High German has been published by

Schlosser (*Predigten*, 3 vols. Frank. 1826); *Nachfolgung des armen Lebens Christi* (Frank. 1833); Schmidt, *Johann Tauler von Strassburg* (Hamb. 1841); and Susannah Winkworth, *Life and Times of Tauler*, with 25 of his sermons translated from the German (Lond. and New York 1857). See also Vaughan, *Hours with the Mystics*, I.

TAUNT, v. *tânt* or *tawnt* [OF. *tanter*, to tempt, to move to evil: F. *tancer*, to chide, to rebuke— from L. *tentārĕ*, to try, assail, agitate (see TEMPT)]: to reproach with severe or insulting words; to censure with scoffs or mockery; to upbraid: N. a severe and insulting reproach; bitter censure; ridicule; invective. TAUNT'ING, imp.: ADJ. addressing in bitter or insulting words; scoffing. TAUNT'ED, pp. TAUNT'ER, n. *-ĕr*, one who taunts. TAUNT'INGLY, ad. *-ĭng-lĭ*, with insult; scoffingly.—SYN. of 'taunt, v.': to reproach; deride; ridicule; scoff; mock; twit.

TAUNTON, *tân'ton:* city, port of entry, and cap. of Bristol co., Mass.; at head of navigation on Taunton river, and on the Old Colony railroad; 15 m. n.-by-e. of Fall River, 17 m. e.n.e. of Providence, 34 m. s. of Boston; 50 sq. m. It is in an agricultural region, but the excellent water-power afforded by the river has made it a notable manufacturing place. Within its limits are several villages, the city proper being considered locally as the part surrounding the central park, known as Taunton Green. The city is laid out with much taste; has efficient water, sewerage, gas and electric light plants; and is embellished with many costly residences surrounded by attractive grounds and conservatories. It has important railroad and water connections with e. and w. points; does a large coasting trade; and for many years has been noted for manufactures of brick and iron, and for its herring fisheries.—T. contains co. court-house, city-hall, 23 churches (several of much beauty), public high school, grammar and graded scho public library, Bristol Acad. (incorporated 1792), State Insane Asylum, City Almshouse, House for Aged and Infirm Women; also 3 national banks (cap. $1,300,000), 2 savings banks; and 2 daily, 2 weekly, and 1 monthly periodicals. In 1903 the net debt was $1,566,914; valua. of real prop. $15,531,730; personal $5,640,832; tax-rate $1.96 on $100. In 1900 the manufacturing capital was $11,737,399, hands employed 7,102, value of products $12,594,814. The most important manufactures, according to value of products, were cotton goods, $4,593,466; foundry and machine-shop products, $2,636,390; iron nails and spikes, $628,187; pottery, terra cotta and fire-clay products, $191,333; bakery products, $177,250. More tacks and small nails are made in T. than in any other place in the world, and nearly half of the shoe-buttons used in the United States are made there. There are 7 cotton-mills, 14 foundries of all kinds, several brick-yards, several ship-building yards, locomotive works, and manufactories of flannel goods, steam-engines, machinery, jewelry, copper goods, silver-plate and britannia ware, and carriages.—T. was originally known by the Indian name Cohannet, and with its surroundings was the special hunting-ground of

King Philip, who spared it during his famous war. It was settled by people from Taunton, England, 1638; incorporated as a township 1639, and chartered as a city 1864. Pop. (1880) 21,213; (1890) 25,448; (1900) 31,007.

TAUNTON, *tawn'ton* (*Tone-ton*), named from being on the banks of the river Tone: town in England, in the extensive and beautiful valley of Taunton Dean, or vale of Taunton, co. of Somerset; 45 m. s.w. of Bristol by railway, 163 m. w.s.w. of London. It communicates by railway with the Bristol and English channels. The streets are wide, well paved, and lighted; the shops are modern and capacious, but the formerly extensive woolen and silk factories have almost wholly departed. Assizes are held here twice yearly. T. is the headquarters of the Somerset Archæological and Nat. History Soc., with its extensive museum in the ruins of the Norman castle—rich especially in fossils from the Devonian strata, and bones of mammalia of the cave period from Mendip and the Somersetshire gravels—and with a reading-room. There are a collegiate school founded by Bishop Fox 1522, two dissenting colleges, several other good schools, and many charitable and other institutions. Ina, King of the West Saxons, built a castle in T. about 700. This was soon after destroyed, but another fortress was built on the site after the Conquest, at which period the town had a mint. In 1127 Giffard, Bp. of Winchester, built and endowed a priory for the canons of St. Augustine; and in 1322 we find a house of Carmelite friars. The Church of St. Mary is a magnificent specimen of Perpendicular architecture, famous for its graceful and delicately ornamented tower. The Church of St. James was the conventual church of T. Priory. The Shire Hall and the Literary Institution are handsome modern buildings. To T. Castle, Perkin Warbeck fled when he failed in storming Exeter. During the civil wars between Charles and the parliament, the town was twice besieged by Goring, and twice successfully defended by Colonel Blake. In T., Monmouth received the heartiest welcome, and Judge Jeffreys exercised his unbounded cruelty.—Pop. (1881) 16,614; (1891) 25,448.

TAU'NUS MOUNTAINS: see NASSAU.

TAURIDA, *tow'rĭ-da:* government in s. Russia, bounded e., s. and s.w. by the Sea of Azov and the Black Sea; area, 24,540 sq. m., 6,990 sq. m. belonging to the Crimea. The peninsula of the Crimea (q.v.) forms the s. portion of the govt. and is connected with the n. portion by the Isthmus of Perekop (q.v.). The region n. of the isthmus is flat; the Crimea contains mountain-ranges which rise above 5,000 ft. The only great river is the Dnieper, which is the n.w. boundary; other principal streams are the Salgir and Alma in the Crimea. Among the salt lakes of the Crimea, which are very productive in salt, the Lake of Sakky is famous for the efficacy of its waters in certain diseases. The climate is temperate and warm on the s. shores of the Crimea. The soil is fertile, but cultivation is very limited. In the n. the pasturage is very rich, and cattle-

breeding is the main employment. In the s. the mountains are clad with forests, the tobacco plant is cultivated, and fruit-growing and wine-culture are principal occupations. The Crimean wines, whose *bouquet* resembles that of Burgundy and the Rhenish wines, are of very good quality. The native riches of T., its excellent ports and harbors, promise commercial progress. Simferopol (q.v.), in the Crimea, is the cap., and Sebastopol (q.v.) and Theodosia are ports of increasing importance.—Pop. (1883) 940,530—247,780 being in the Crimea (1897) 1,443,566.

TAURIDES, n. *taw'rĭ-dēz:* in *astron.*, meteors having their radiant point in the constellation Taurus.

TAURIN, n. *taw'rĭn* [L. *taurus*, a bull—named from having been discovered first in the bile of the ox]: $C_2H_7SNO_3$, crystalline substance occurring in bile and in other animal products and tissues. In a state of purity, it forms six-sided glistening prisms, which are perfectly transparent, neutral, devoid of odor, readily soluble in hot water, but difficult of solution in cold water, and insoluble in alcohol and ether. It does not enter into combination with either acids or bases. When heated, it undergoes decomposition, and evolves sulphurous acid, in consequence of the sulphur (more than 25 per cent.) which it contains. As a product of the decomposition of the bile, it may be found in the contents of the intestine and in the excrements; and in cases of jaundice it has been found in the blood, transudations, and urine. For its artificial formation, see SYNTHESIS.

TAURINE, a. *taw'rĭn* [L. *taurus;* Gr. *tauros*, a bull]: of or relating to a bull; bull-like; bovine. TAU'RUS, n. *-rŭs*, the second in order of the twelve signs of the zodiac, containing, among others, the constellations *Pleiades* and *Hyades*. TAU'RICORNOUS, a. *-rĭ-kawr'nŭs* [L. *cornu*, a horn]: horned like a bull. TAU'RIFORM, a. *-fawrm* [L. *forma*, a shape]: formed like a bull.

TAUROCHOLIC, a. *taw'rō-kŏl'ĭk* [Gr. *taurŏs*, a bull; *chŏlē*, bile]: an acid procured from the bile of the ox, and found in quantity in the bile of man. TAU'ROCOLL, n. *-rō-kŏl* [Gr. *kolla*, glue]: glue made from a bull's hide.

TAUROME'NIUM: see TAORMINA.

TAU'RUS, MOUNT: see ANATOLIA.

TAUT, a. *tawt:* tight; not slack; firm; secure; properly ordered; prepared against emergency.

TAUTAUG': see TAUTOG.

TAUTOCHRONE, n. *taw'to-krōn* [Gr. *tauto*, for *to auto* the same; *chronos*, time]: in *math.*, a curve, such that a heavy body rolling down it, under the influence of gravity, will always reach the same point at the same time, from whatever point it may start.

TAUTOG, *taw-tŏg'* (*Tautoga onitis* or *Americana*): fish of family *Labridæ* (q.v.). It is found on the Atlantic coast of the United States, and is in great request for the table, bringing a high price in the New York market. It attains a size of 12 or 14 lbs. Its color is black on the back and sides; the belly is whitish; both jaws have a double row of strong conical teeth; the face is covered with a scaleless integument. The T. is caught by hook and line on rocky bottoms. It is sometimes kept to fatten. Other names given to it are oyster-fish and black-fish—the latter name applied to other fish, including some of the dolphins.

TAUTOLOGY, n. *taw-tŏl'ō-jĭ* [Gr. *tautolog'ia*, tautology—from *tautos*, the same; *logos*, a word]: needless repetition of the same idea or meaning in different words or phrases; it is classed among the worst vices of style. TAUTOLOGICAL, a. *taw'tō-lŏj'ĭ-kăl*, marked or characterized by tautology. TAU'TOLOG'ICALLY, ad. *-lĭ*. TAUTOLOGIZE, v. *taw-tŏl'ō-jīz*, to repeat the same idea or meaning in different words. TAUTOL'OGIZING, imp. TAUTOL'OGIZED, pp. *-jīzd*. TAUTOL'OGIST, n. *-jĭst*, one who tautologizes.

TAUTOPHONY, n. *taw'tŏf'ō-nĭ* [Gr. *tautos*, the same; *phōnē*, sound]: repetitition of the same sound. TAU'TOPHON'ICAL, a. *-tō-fŏn'ĭ-kăl*, repeating the same sound.

TAVERN, n. *tăv'ĕrn* [F. *taverne*, a tavern—from L. *taberna*, a shed—akin to *tabŭla*, a board, a plank—*lit.*, a boarded hut]: an inn or inferior hotel; place of entertainment for man and beast; public-house: see INN: INNKEEPER: PUBLIC-HOUSES: HOTEL.

TAVERNIER, *tä-vĕr-ne-ā*, JEAN BAPTISTE, Baron D'AUBONNE: French traveller: 1605–89; b. Paris; son of a Flemish engraver who had settled there. The conversation of the savants who frequented his father's shop inspired him with curiosity to visit other countries, and he left the parental roof before his 15th year. After visiting England, the Low Countries, Germany, Hungary, and Italy, he eagerly caught at the offer made to him by Father Joseph (confidant of Richelieu), to accompany two French noblemen to the East. This journey (1630, Dec.—1633) was through Regensburg, Dresden, Vienna, Constantinople (where he left his masters), Erzeroum, Tabriz, Ispahan, Bagdad, Aleppo, and Scanderoon, and thence by sea to Rome. T. then obtained an important post in the household of the Duke of Orleans, with occasional leaves of absence for journeys in the East. The *second journey* (1638–43) was from Marseilles to Scanderoon, thence across Syria to Ispahan, s.w. Persia, and Hindustan; the *third* (1643–49), through Ispahan, much of Hindustan, Batavia, and other parts of the E. Indies; and in the *fourth* (1651–55), *fifth* (1656–?), and *sixth* (1663–69), various portions of Persia and Hindustan were visited, the outward route being generally by way of Syria and the Arabian desert, and the return by Asia Minor. T. invariably travelled as a dealer in precious stones and other valuable articles of small bulk, and his great profits strongly impressed on him the advantages of regular commerce between Europe and

the East. On his return to France 1669, he was graciously received at court by Louis XIV., who presented him with 'letters of nobility' in reward for his services to French commerce in India. But his prodigal expenditure and careless generosity speedily reduced his fortune, and the revocation of the Edict of Nantes compelled him as a Protestant to take refuge in Switzerland, whence he removed to Berlin, and became director of an E. India company projected by the elector of Brandenburg. To discover a road to the Indies through Russia, he set out from Berlin 1688, but died at Moscow. An account of his travels was written for him (for T. had no literary qualifications), and though full of matter valuable to the historian and geographer, it is so ill-arranged as to be in many cases almost unavailable. T. was one of the most remarkable of travellers; wholly devoid of classic sentiment, he traversed the plains of Troy, and passed the ruins of Persepolis without even a flutter of interest; and partly because of this remarkable condition of mind, his statements are distinguished by an unusual truthfulness. But the chief value of his book is in the fullness and accuracy of its details concerning the nature and state of oriental commerce, the chief markets and commercial routes, and the various systems of coinage and their relations. Some of his statements concerning the conduct of the Dutch in the E. Indies called forth a most virulent and abusive reply from Jurieu, the Prot. theologian, in his *L'Esprit de M. Arnauld* (1684), and a more moderate one from Van Quellenburgh; but all T.'s important assertions were found perfectly correct. His Travels were originally pub. in 3 vols. (two in 1676–7, the third 1679); they have since been several times repub., last in 1810, in 7 vols.; Eng. transl. (1678,84, 2 vols.), Dutch (1682), German (1684).

TAVIRA, *tä-vē'rä:* seaport-town of Portugal, province of Algarve, 20 m. n.e. of Faros, pleasantly situated at the mouth of the Sequa. T. has decayed considerably since 1654, when, it is said, 40,000 people in the town and environs fell victims to the plague.—Pop. (1890) 11,558.

TAVISTOCK, *tăv'ĭs-tŏk:* market-town of Devonshire, England; on the w. border of Dartmoor, 113 m. w.s.w. of London, about 35 m. s.w. of Exeter, in the fertile valley and on the right bank of the Tavy (whence its name), which is here crossed by two bridges. T. has manufactures of serges and woolen cloths, iron-foundries and mining-works—copper, lead, tin, and iron being found in the neighborhood; but the population is chiefly agricultural. It is an ancient town, and formerly derived great importance from its abbey, the largest and most magnificent in Devonshire, founded 961, for the Benedictine order, by Ordgar, Earl of Devonshire, father of the infamous Elfrida, and endowed with many privileges—its abbot being a peer of parliament. At the dissolution it was bestowed on John, Lord Russell, whose descendant, the Duke of Bedford, still holds the property. A printing-press, the second in England, was established in the abbey at a very early period. The refectory and abbey gateway

still stand in good preservation. The parish church is a handsome edifice, with a tower at the w. end, resting on arches under which there is a thoroughfare. At the breaking out of the civil war, Pym (q.v.) was member for T.—Pop. (1881) 6,914; (1891) 6,252.

TAVOY, *ta-voy*: chief town of a dist. in Tenasserim, Brit. Burmah; on the left bank of the Tavoy river, about 30 m. from its mouth, about 220 m. s. of Moulmein. The site is low, inclosed on three sides by rice-fields and on the fourth by the river. The houses are scarcely visible from the river—being nearly concealed by umbrageous trees, palms, plantains, jacks, cassias, and hundreds of flowering shrubs. There is a hospital, a large jail, and a roomy *zayat* or caravansary. The houses are raised from the ground on piles, and are of bamboo fastened with rattan and thatched with the leaf of the water-palm. T. is remarkable for its grand annual buffalo-fight, continuing two days, during which eight pair of buffaloes are brought into the field. The rice-fields around T. are prolific sources of malaria. Intermittent fevers and dysentery are the most frequent diseases; yet the climate is on the whole healthful. T. exports rice, sugar, wood-oil, timber, and fruits. The anchorage for large ships is at Goodridge Plains, about 30 m. below the town. Pop. (1881) 13,372.—The *District* of T. has 7,150 sq. m.; pop. (1881) 84,988.

TAW, v. *taw* [AS *tawian*; Low Ger. *tauen*, to taw or dress leather; Dut. *touwen*, to soften]: to dress (skins) by impregnating them with saline, oily, and other matters, instead of tanning them. TAW'ING, imp.: N. art or operation of preparing skins for white leather. TAWED, pp. *tawd*: ADJ. rendered like leather. TAWER, n. *taw'er*, one who taws. TAW'ERY, n. *-i*, a place where skins are dressed by tawing.

TAW, n. *taw* [perhaps connected with TEE 2 (q.v.)]: a child's marble; a game of marbles, or the spot or line from which it is played.

TAWDRY, a. *taw'dri* [a corruption of *St. Audry*, which in its turn is a corruption of *St. Etheldreda*, the saint who founded Ely Cathedral: *St. Audry's* Fair, held in the Isle of Ely and elsewhere, was noted for the gingerbread ornaments and laces sold in its booths]: vulgarly showy in dress; having an excess of showy ornaments arranged without taste. TAW'DRILY, ad. *-li*. TAW'DRINESS, n. *-nes*, an excessive show of finery, mean and vulgar.

TAWNY, a. *tawn'i* [F. *tanné*, tawny, dark—from *tan*, tan (see TAN)]: of a yellowish dark color, like that of tanned leather, or of persons browned by the sun. TAWN'INESS, n. *-nes*, the quality of being tawny.

TAWS, or TAWSE, n. plu. *tawz* [see TAW 1]: in *Scot.*, a leather strap cut into stripes at one end, used as an instrument of punishment for children in schools.

TAX, n. *tăks* [F. *taxer*, to rate, to tax—from L. *taxārĕ*, to rate or value—from *tangĕrĕ*, *tactum*, to touch]: duty or rate imposed by government on property, the products of industry, incomes, and the like, to defray the expenses of government (see below); tribute; impost; burden; charge: in *OE.*, censure: V. to lay a rate or impost on; to assess or settle judicially, as a bill of costs; to exact from; to censure; to accuse, followed by *with*. TAX'ING, imp.: N. act of laying an impost on. TAXED, pp. *tăkst*. TAXER, n. *tăks'ĕr*, one who taxes. TAX'ABLE, a. *-ā-bl*, that may be taxed. TAXATION, n. *tăks-ā'shŭn*, act of laying on a rate or impost, the taxes imposed on a community by the government to defray its expenses; the revenue so raised (see TAX, below): in *OE.*, accusation; scandal. DIRECT TAXES, taxes paid personally by the individual to the tax-gatherers, in contradistinction to *indirect taxes* (see under INDIRECT). TAX-GATHERER, collector of taxes. TAXATION OF COSTS (see below).—SYN. of 'tax, n.': impost; assessment; duty; toll; contribution; tribute; rate; exaction; demand; custom; dues; charge; levy.

TAX: exaction of money from the individual citizens of a country to defray the expense of government, or for the uses of the state. The main points to be considered in levying a tax relate to its justice, to its productiveness, and to its expediency.

Taxes in the United States are levied by the general govt.; or by the states; or by the minor civil authorities—towns, counties, etc. Federal taxes are raised almost exclusively by means of customs duties; the exceptions being the stamp tax on spirituous and malt liquors, the license tax on the sale of liquors, the stamp tax on manufactures of tobacco, and the license tax on their sale. During the civil war, taxes were laid by congress on incomes, on proprietary medicines, on lucifer matches, on legal instruments, and on many other subject-matters. The U. S. constitution grants power to congress to impose taxes in every form, but requires that direct taxes (not including income taxes) be apportioned to the several states according to their respective populations, and that all duties, imposts, and excise taxes be uniform throughout the country.

The primary object of taxation is provision of means of conducting government: among secondary objects the chief is protection of domestic industry: see PROTECTIVE TARIFF. In levying taxes, the legislator—according to Adam Smith—should be governed by such maxims as these: (1) The subjects of every state ought to contribute toward the support of the govt. as nearly as possible in proportion to their respective abilities, i.e., in proportion to the revenue which they respectively enjoy under the protection of the state. (2) The tax which each individual is bound to pay ought to be certain and not arbitrary. The time of payment, the manner of payment, the quantity to be paid, all ought to be clear and plain to the contributor and to every other person. (3) Every tax ought to be levied at the time or in the manner in which it is

most likely to be convenient for the contributor to pay it. (4) Every tax ought to be so contrived as both to take out and to keep out of the pockets of the people as little as possible beyond what it brings into the treasury of the state.—The foregoing maxims have received general approval among legists, except that, in the case of taxation of the revenues of individuals, a graduated income tax, rising as income rises, is now generally held to be more equitable than an even percentage tax on all incomes.—A tax is *direct* 'which is demanded from the very persons who it is intended or desired should pay it;' while *indirect* taxes are 'those which are demanded from one person in the expectation and intention that he shall indemnify himself at the expense of another' (John Stuart Mill).

The achievement of popular govt. in England is mainly the outcome of efforts to give to the people control of the public purse through the right of self-taxation. The constitutional doctrine thus created by the mother country was remembered by the American colonists when the British govt. sought to raise in the colonies a stamp duty and a customs duty on tea—a tyrannous attempt from the point of view of the British constitution, for 'taxation without representation is tyranny.'

How to make taxation productive is a vast and complicated practical science. Turgot, one of the wisest of financiers, called it the art of plucking the goose without making it cry. The most ingenious devices to this end have often, in practice, met counteracting difficulties. It was supposed that indirect taxation—i.e., a duty levied on articles before they reach the consumer—must, in a civilized and orderly country, be almost inexhaustible. The merit of the system lay in the consideration that the burden of the tax did not fall directly or wholly on the person who paid it. Income tax, house tax, dog tax, and the like, are levied directly on the person on whom the burden ultimately falls; and if he do not pay, the amount will be taken by force. Tea duty, wine duty, and the like, on the other hand, are not levied on the consumer, though he has to pay them; they are levied on the importer, who has no interest or a slight interest against the tax, since he must charge it on the consumers. But this form of taxation is met by checks. If it is excessive, people will not buy the taxed article; and it has often been found that reducing the duty increases the revenue. An indirect tax on luxuries, especially on those liable to be used to vicious excess, has strong recommendations: in some cases it would be no great calamity should the tax throw the article nearly out of use. But then comes another check in the smuggler, whose influence may probably do more to corrupt and disorganize society than the free use of the article in which he deals. A tax on the necessaries of life, on bread or salt, cannot be evaded, as in the case of luxuries, by abandonment of the use; therefore it is very productive, but it is also very oppressive. The tax on salt in France was one of the chief causes of the French Revolution. The happiest condition for the revenues of a country

is when luxuries are so abundantly used by all classes that a small addition to their price is a slight burden, yet yields a large revenue.

In 1901-2 the internal revenue of the United States was $271,867,990, a decrease of about $35,000,000 due to repeal of war taxes; and the customs revenue was $254,444,708, an increase of about $15,800,000. The principal sources of internal revenue were spirits $121,138,013, tobacco $51,937,925, fermented liquors $71,988,902, oleomargarine $2,944,492, special taxes $11,610,286, penalties $208,209.—In the states and territories the rate of tax for gen. purp. is liable to vary at dif. times, and ranged (1902) from 17.29 cts. in New Mex. to 90 cts. in Ariz. on each $1,000 of asses. valuation of real and personal prop. The rate in cities, towns, villages, etc., also varies according to local financial necessities, and ranged (1902) from 76 cts. in Denver, Colo., and $1.00 Fort Wayne, Ind., and to $9.85 in Springfield, O., on each $100 of assessed valuation. Where there is a legislative prohibition against exceeding a specified rate, taxing-officers usually provide for any increase of revenue that may be needed by raising valuations, particularly on real estate; hence it may be stated generally that the higher the valuation the lower the rate, and *vice versâ*. Exemptions from taxation are matters of state enactment, and, accordingly, show wide differences. See CUSTOMS DUTIES: EXCISE: POST-OFFICE: STAMP: LAND-TAX: FINANCE.

TAX, SINGLE: impost laid on land values or (which is the same thing) on economic rent, and designed to defray all the costs of government without resort to any other mode of raising public revenue: it is the *impôt unique* of the French economists Quesnay and Turgot in the 18th c., and is the remedy suggested by the American economist Henry George for poverty and the ills attending it. In his work *Progress and Poverty* (1879), Henry George compares the system of the single T. with the requirements of equitable taxation as laid down by Adam Smith (see TAX), and argues that in his system alone are all those requirements fully met. His plan was gradually to abolish all other taxes, commensurately increasing the tax on land until from that source alone all governmental expenses might be drawn. He reasoned that by the application of such a system the burden of taxation would be lifted from the agricultural districts where land is comparatively valueless, and would be transferred to towns and cities, where, as in New York, land has such an enormous value that the most costly and towering buildings are not so valuable as the bare land which they cover; that such is the case wherever civilization centres; and that the same social advance which by increasing public needs calls for larger public revenues, correspondingly, and even more than correspondingly, increases the value of land. He argued that this single tax offered the cheapest and in all respects the best mode of raising public revenues; that a tax on the value of land is not a tax on land, but on an advantage accruing on specially desirable land; that while

such a tax would avoid all the waste, loss, and fraud of indirect taxes, it would avoid also the evasions and injustice that attend attempts to tax incomes of all kinds, and would be of all possible taxes that which might be most cheaply, certainly, and equitably obtained; that it could not be evaded, because land cannot be concealed or removed, and its value can be ascertained with greater ease and certainty than any other value; that the 'unearned increment' belongs to society itself as distinguished from its individual members; that the single tax would abolish all other taxes, and would in every way promote the cause of civilization. Mr. George, in his *Social Problems* (chap. xix.), thus briefly defines the purpose of the single T., and sums up its chief expected results: 'All that is necessary to do is to abolish all other forms of taxation until the weight of taxation rests upon the value of land irrespective of improvements, and take the ground-rent for the public benefit. In this simple way, without increasing governmental machinery, but on the contrary greatly simplifying it, we could make land common property. And in doing this we could abolish all other taxation, and still have a great and steadily increasing surplus, a growing common fund, in the benefits of which all might share. . . Under this system no one could afford to hold land he was not using, and land not in use would be thrown open to those who wished to use it, at once relieving the labor market and giving an enormous stimulus to production and improvement.'

This theory of taxation has found favor with multitudes of men who fail to see how it is to be brought into practical application.

TAXA'TION OF COSTS, in American Law Practice: fixing the amount of money to be paid by the losing side in a suit, on account of expenses incurred by the opposite side. The jury is obliged to make separate assessment of 'costs' and 'damages.' If the costs assessed by the jury appear insufficient, the party to whom they are awarded may have an assessment made by the clerk of court or prothonotary.—In England, T. of C. means checking or reviewing the charges made by attorneys or solicitors, and the taxation is made by a 'taxing-master' or a 'registrar;' for in Britain a solicitor's charges are regulated according to a standard set by the court. Every step in a suit has a certain value put on it by the court, and the business of the taxing-officer is to see that this standard is not transgressed. But the charges of a solicitor only (not of a barrister or pleader) are subject to revision by the taxing-master.

TAX'EL: see BADGER.

TAXICORNES, *tăks-ĭ-kawr'nēz:* widely distributed family of coleopterous insects, of section *Heteromera*, having the body generally square; thorax either concealing or receiving the head; antennæ short; legs adapted for running. Most of them are found in fungi and beneath the bark of trees.

TAXIDERMY, n. *tăks'ĭ-dĕr'mĭ* [Gr. *taxis*, an arranging; *derma*, a skin]: art of preparing and preserving skins of animals (with the fur, feathers, or scales) in their natural appearance. TAX'IDER'MIST, n. *-mĭst*, one skilful in preparing and preserving animals for display. TAX'IDER'MIC, a. *-mĭk*, pert. to.—*Taxidermy* includes mainly the preparation of the skins of the animals to be preserved, and subordinately the stuffing and mounting of them. In the case of small animals, to prepare the skin for stuffing, it is removed carefully from the body, and, any adherent flesh having been cleaned away from it, it is anointed with arsenical soap. For making this soap there are several formulæ, the following being much used: arsenic, 1 ounce; white soap, 1 ounce; carbonate of potash, 1 dram; distilled water, 6 drams; camphor, 2 drams. This keeps the skin supple, and prevents decay and the attacks of insects. The larger skins are prepared usually with a composition called Preservation Powder, of the following ingredients: arsenic and burnt alum, each 1 lb.; powdered oak-bark, 2 lbs.; camphor, ½ lb. These substances are reduced to a powder, mixed, and passed through a fine sieve. The material must be carefully kept in well-stoppered bottles or jars; and when used is thickly sprinkled over the flesh side of the skin while still wet, and must be thoroughly rubbed in. Gloves should always be worn in this process, to prevent danger from the poisonous compound. Some skins are prepared with alum only, others with the oak-bark liquor of the tanner's pits: this, in very large skins, suffices well.—The stuffing and mounting of skins requires much personal experience, and its methods vary with almost every group of animals.

TAXIN, n. *tăks'ĭn* [L. *taxus*, a yew-tree]: the resinous substance found in the leaves of the yew-tree.

TAXIS, n. *tăks'ĭs* [Gr. *taxis*, an arranging—from *tassō*, I arrange]: in *surg.*, replacing of parts which have left their natural situation, by the hand without instruments.

TAXOLOGY, n. *tăks-ŏl'ŏ-jĭ* [Gr. *taxis*, an arranging; *logos*, discourse]: the methods adopted for classifying various forms of animal and plant life, and the laws regulating the variations of species, etc.; systematic botany; same as *taxonomy*. TAXOL'OGIST, n. *-ŏ-jĭst*, one skilled in.

TAXONOMY, n. *tăks-ŏn'ō-mĭ* [Gr. *taxis*, an arranging; *nomos*, law]: the department of natural history which treats of the laws and principles of classification. TAXON'OMIST, n. *-mĭst*, one skilled in these laws and principles of classification.

TAY, *tā:* longest river in Scotland, draining nearly the whole of Perthshire (q.v.), and pouring into the German Ocean more water than any other British river. Its source is 553 ft. above sea-level; in the w. of the county of Perth, and in its earliest course it is known as the Dochart (some say the Fillan). The Dochart, the principal feeder of Loch Tay (see below), rises in Ben Lui, on the borders of Argyleshire, and, flowing n.e., is joined by the Lochy, just before the united streams enter the loch. After leaving it,

the Tay flows e.n.e., when, turning s., it passes, with a winding course, Dunkeld (q.v.) and Perth (q.v.). About a mile below Perth, turning e.n.e., it widens at the mouth of the Earn (q.v.) into an estuary—the Firth of Tay, which varies from three-fourths of a mile to three m. in breadth, mostly between the counties of Fife and Forfar—and joins the German Ocean about ten m. below Dundee (q.v.). Its total length from the source of the Dochart to Perth is about 95 m., to which its estuary adds about 25 m.; and its basin comprises about 2,400 sq. m. The scenery, especially in its middle course, is singularly picturesque. The salmon-fishings on the Tay and its tributaries are of considerable value. The tide flows to a mile above Perth; but the navigation up to Dundee is greatly impeded by shifting sand-banks. The railway bridge (1871–78) spanning the estuary near Dundee (nearly two m. long) fell during the crossing of a passenger train, in a great gale 1879, Dec. 28, with the loss of nearly 90 lives. A new bridge at lower elevation, begun 1882, was opened for general traffic 1887.

Loch Tay is a long and narrow lake, an expansion of the river Tay about 25 m. from its source; picturesquely situated in a basin scooped out of the bosom of the mountains, 355 ft. above sea-level; length about 15 m., average breadth 1 m., depth varying from 100 to 600 ft. Ben Lawers (q.v.) rises on its w. side. The loch is at times subject to violent and unaccountable agitations.

TAYLER, *tā'lĕr*, JOHN JAMES, D.D.: 1798-1869, May 28; b. Nottingham, Eng.: educator. He graduated at the Univ. of Glasgow 1818; was ordained a Unitarian minister at Manchester 1820; sec. of York College 1822–40, and, after its removal to Manchester, prof. of ecclesiastical history and of doctrinal theol.; removed to London with the college 1855, and after its re-organization as Manchester New College became its principal. In 1868 he represented the English Unitarians at the tercentenary celebration of the denomination in Hungary. He also held a pastorate several years, and published many scholarly works.

TAYLOR, *tā'lĕr*, ALFRED: 1810, May 23—1891, Apr. 19; b. Fairfax co., Va.: naval officer. He entered the U. S. navy as midshipman 1825; was promoted passed midshipman 1831, lieut. 1837, commander 1855, capt. 1862, commodore 1866, and rear-admiral 1872, Jan. 29; and was retired 1872, May 23. During his naval career he was on sea-service 18 years 3 months, on shore or other duty 18 years 3 months, and was unemployed 29 years 6 months. He was in the blockade of Vera Cruz in the Mexican war, with Com. Perry on the Japan expedition 1853–55, and at the Boston navy-yard during most of the civil war.

TAY'LOR, BAYARD: author and traveller: 1825, Jan. 11—1878, Dec. 19; b. Kennett Square, Chester co., Penn. Having received a common-school education, he was apprenticed at the age of 17 in a printing-office, when he began his poetical contributions to periodicals. In 1844 he published *Ximena*, a volume of poems; and soon afterward started on a pedestrian tour of Europe, publishing 1846 *Views Afoot, or Europe Seen with a Knapsack and Staff*. After his return, he edited a country newspaper, then went to New York and wrote for the *Literary World* and *Tribune*. Of the latter he became asst. editor; and as its correspondent made extensive travels—in Cal. and Mex., recorded in *El Dorado, or Adventures in the Path of Empire* (1850); up the Nile to lat. 12° 30′ n., and in Asia Minor, Syria, across Asia to India, China, and Japan—recorded in *Journey to Central Africa*, *Lands of the Saracen*, and *Visit to India, China, Loo-Choo, and Japan* (1853). Later explorations are recorded in *Northern Travel, or Summer and Winter Pictures of Sweden, Denmark, and Lapland* (1858); and *Travels in Greece and Russia, with an Excursion to Crete* (1857); *Travels in Greece and Rome* (1859); *At Home and Abroad* (1859–62); *Colorado* (1867); *Byways of Europe* (1869); *Travels in Arabia* (1872); *Egypt and Iceland* (1874). In 1862–3 he was connected with the U. S. embassy at St. Petersburg, and for a while had it in his sole charge; 1874 he visited Iceland. He resided some years in Germany, and 1878 was appointed U. S. minister at Berlin, where he died. Besides the works above noted, T. was author of *Rhymes of Travel, Ballads, and Other Poems* (1848); *Book of Romances, Lyrics, and Songs* (1851); *Poems of the Orient* (1854); *Poems of Home and Travel* (1855); *Hannah Thurston*, a novel (1863); *John Godfrey's Fortunes* (1864); *The Story of Kennett* (1866); *Joseph and His Friend* (1870); *Beauty and the Beast*, and *The Masque of the Gods*

(1872); *The Prophet: a Tragedy* (1874); *Home Pastorals*, etc. (1875); *Prince Deukalion*, a drama (1878). In 1871 he published an admirable translation of *Faust*. See *Life and Letters* (2 vols. 1884).

TAY'LOR, BROOK, LL.D.: one of the chief English mathematicians: 1685, Aug. 18—1731, Dec. 29; b. Edmonton, Middlesex; of a Puritan family of good position. He entered St. John's College, Cambridge, 1701, when mathematical science was the prominent pursuit among the learned; took his degree LL.B. 1709, became a fellow of the Royal Soc. 1712, and its sec. 1714. Though young, he had become, through his valuable treatises, widely known in Britain and on the continent for great proficiency in mathematics, and for power and versatility of mind. In 1716 he was received in Paris with warm regard by the French savants. On his return to England 1717, he resumed severe study. T. was married twice. Besides his earlier works, he contributed a series of able papers on higher algebra, dynamics, and general physics, published separately his *Methodus Incrementorum* 1715, and *Treatise on Linear Perspective*, the first general exposition of this subject, 1719. During the last ten years of his life, he was engaged in metaphysical and biblical studies. His manners were engaging, and he was socially a favorite. His *Methodus Incrementorum* contains, besides the famous 'theorem' (see TAYLOR'S THEOREM), the first germs of the calculus of finite differences, various now common forms of infinitesimal series, with mechanical, physical, and algebraical applications. The effect of his demonstrations remained long unappreciated, till it was developed by writers of more lucid style. Some results of his investigations are in *Phil. Trans.* (1713–23).

TAY'LOR, EDWARD THOMPSON: Methodist Episc. minister and seamen's chaplain: 1793, Dec. 25—1871, Apr. 6; b. Richmond, Va. Left an orphan, he was a sailor-boy from his seventh year. In 1812, while on a privateer, he was made prisoner, and acted as chaplain for his fellow-prisoners while confined in England. He manifested remarkable natural gifts of eloquence, and was licensed to preach 1819 by the New England Meth. Episc. conference; and from 1828 until his death served laboriously and with wonderful success as chaplain of the Seamen's Bethel at Boston—becoming widely known as the eloquent 'Father Taylor,' and for his shrewd wit. He was chaplain of the *Macedonian*, the U. S. warship, sent loaded by private benevolence to relieve the famine in Ireland 1846–7; and he attracted notice by his addresses made there and in Scotland. The influence of his sympathetic nature and Christian earnestness was great with sailors; and, after a life of zealous usefulness, he died in Boston.

TAY'LOR, GEORGE: 1716–1781, Feb. 23; b. Ireland; signer of the Declaration of Independence. He received a liberal education, studied medicine, came to America as a redemptioner 1736, learned the iron-foundry business in Penn., and, marrying the widow of his employer, established large iron-works on the Lehigh river. In 1764 he was elected to the Penn. assembly, 1770 became co. court judge, 1775 went to the provincial assembly, and 1776, July 20, was elected to the continental congress to fill a vacancy, too late to vote for the declaration, but in time to sign it.

TAY'LOR, ISAAC: English philosophical and theological writer: 1787–1865, June 28; b. Lavenham, in Suffolk; the third of his name who attained distinction; son of Isaac T. of Ongar, a dissenting minister. Charles T., editor of *Calmet*, was his uncle; and Jane T. (1783–1824), author of *Q. Q. Papers*, and Ann T. (Mrs. Gilbert of Nottingham) (1782–1866), joint-authors of *Hymns for Infant Minds*, were his sisters His literary career began 1818, in contributions to the *Eclectic Review*, then conducted by Robert Hall and John Foster; and it ended 1865, in contributions to *Good Words*, accompanying those of men unborn when he was in the height of his reputation. T. became a member of the Established Church. 1822–27 he published *Elements of Thought; Characters of Theophrastus*, with illustrations, etched by himself (for he was an artist and engraver); *The History of the Transmission of Ancient Books to Modern Times; The Process of Historical Proof;* a translation of Herodotus; and *Memoirs and Correspondence of Jane Taylor*. In 1829 he published, anonymously, *The Natural History of Enthusiasm*, which ran rapidly through several editions; and 1829–36 he published *Fanaticism; Spiritual Despotism; Saturday Evening;* and *The Physical Theory of Another Life*. In 1836 appeared *Home Education*. Thereafter he was occupied on a new translation of Josephus, with the Rev. Dr. Traill. In his later years appeared *Loyola; Wesley; The Restoration of Belief; Logic of Theology; Ultimate Civilization;* and *The Spirit of Hebrew Poetry*. He wrote also many articles for the quarterly reviews. T. had a prolific and original mind, and several of his works (nearly all repub. in New York) commanded a very large circulation. He made many mechanical inventions, two of which revolutionized the art of calico-printing.

TAY'LOR, ISAAC, M.A.: rector of Settrington, Yorkshire, England; b. Stanford Rivers, Essex, 1829, Mar. 3; eldest son of Isaac T. (1787–1865). He is author of *The Liturgy and the Dissenters;* but has best maintained the literary distinction of his family by his works on philology. His *Words and Places, or Etymological Illustrations of History, Ethnology, and Geography* (1864), is a work of erudition. His work on *The Alphabet* (2 vols. 1883) elaborates with great research a theory tracing the development of ancient and modern alphabets through Phœnician or s. Arabian forms to an ancient hieratic Egyptian script, and ultimately to certain select phonetic hieroglyphs.

TAY'LOR, JEREMY, D.D.: one of the greatest names in the English Church: 1613 (baptized 1613, Aug. 15)—1667, Aug. 13; b. Cambridge; son of a barber, who was respected among his townsmen. At the age of 13, T. entered Caius College as a sizar, and after seven years' strenuous and brilliant study in classics and theology took the degree M.A. Like Abp. Usher, he was admitted to holy orders before he had reached his 21st year. Soon he attracted the notice of Laud (who had regard for learning, if not for liberty), and was preferred by him to a fellowship at All Souls, Oxford (1636). About the same time, he was appointed chaplain in ordinary to the king; and 1638 rector of Uppingham, a preferment which he retained till the successes of the parliamentarians deprived him of it. His first notable publication was a defense of the church, *Episcopacy Asserted* (Oxford 1642). During the next three years, T. probably accompanied the royal army; but when the king's cause became hopeless, he withdrew into Wales (1645–6), and, with two other deprived clergymen, opened a school at Newton Hall, which appears to have been a successful adventure. T. found a patron in the Earl of Carbery, then living in the same county at his family seat of Golden Grove, and who appointed him his domestic chaplain. This period of T.'s life (1647–60), outwardly obscure, is illustrious with the splendor of his literary achievements. In these 13 years all his great works were produced. In 1647 was published *Liberty of Prophesying*, a work on behalf of the clergy of the Church of England, who were being expelled from their livings by the Puritans, but in which the pleadings are based on principles far more comprehensive and tolerant than the age was prepared to acknowledge; in 1650, the *Life of Christ* (2 vols.), one of the most popular of his productions, and *The Rule and Exercises of Holy Living;* in 1651, *The Rule and Exercises of Holy Dying*, a portion of his *Sermons*, and *Discourse of the Divine Institution, Necessity, and Sacredness of the Office Ministerial;* in 1652, *Discourse on Baptism, its Institution, and Efficacy upon All Believers;* in 1653, 25 additional *Sermons;* in 1654, *The Real Presence and Spiritual of Christ in the Blessed Sacrament;* in 1655, *The Guide of Infant Devotion, or the Golden Grove*, and the *Unum Necessarium, or the Doctrine and Practice of Repentance*, a decidedly Pelagian treatise which involved him in a considerable controversy; in 1657, *Collection of Polemical and Moral Discourses, Discourse on Friendship*, etc.; and in 1660 his famous *Ductor Dubitantium, or the Rule of Conscience in All Her General Measures*, the most learned, subtle, and curious of all T.'s works. It was dedicated to Charles II. T. was a stanch royalist, a splendid scholar, a consummate theologian, and a man of wonderful literary genius. Early after the restoration of Charles II., he was elevated to the bishopric of Down and Connor, 1660. T. was not happy in his Irish see. Before a year was past, he was anxious to be delivered from it as from 'a place of torment.' The Scotch Presb. ministers were 'incendiaries'—they robbed him of the 'people's hearts;' they even 'threatened to murder' him; his only

hope was in the government and the military. Altogether, it is a melancholy spectacle to behold the finest ecclesiastical and literary genius of the time half broken-hearted by petty squabbles with intolerable fanatics, who had, nevertheless, in some of the special points at issue between them and T., something like justice on their side. No modern mind would hesitate for an instant to acknowledge that the Scotch-Irish Presb. clergy were acting within their legal rights; yet we fear it is too plain that the good bishop would have gladly seen them prohibited from their functions by an Episcopalian soldiery. Indeed, the author of the *Liberty of Prophesying*, on one occasion, only three months after his consecration, actually deposed 36 Presb. ministers occupying livings which the restoration had inconsiderately and tyrannically declared to be Episcopalian. This was in the manner of that age. Some interesting information in regard to this almost unknown period of Bp. T.'s life is in *Notes and Queries* (1865, Nov. 11).

T. is sometimes styled the modern Chrysostom (q.v.), for his golden eloquence: he has indeed no equal in the whole series of ecclesiastical writers for richness of fancy. All other divines—patristic, mediæval, and modern—show poor and meagre beside him in this respect. Some are more logical, or penetrating, or profound; some grasp more clearly the spiritual significance of doctrine, or evince deeper knowledge of human nature; but T. ranks among the first men of his age in learning, subtlety of argument, elevation of devout feeling, and philosophic largeness of view; while his inexhaustible imagery, shining 'like the glossy purples of a dove's neck,' and full of all tender and pathetic beauty, reminds us of Spenser and Shakespeare, of Sidney and Fletcher, rather than of the sombre order of theologians.—The best ed. of his works is by the Rev. C. P. Eden, fellow of Oriel College, Oxford (10 vols. London (1854).

TAY'LOR, NATHANIEL WILLIAM, D.D.: Congregational theologian: 1786, June 23—1858, Mar. 10; b. New Milford, Conn. He graduated at Yale 1807; and, after privately pursuing theology, became pastor of the First Church, New Haven, and soon widely known for the solid, logical, impressive character of his preaching, and its candor and independence of statement. In 1822 he was elected the first Dwight prof. of theol. in Yale, and continued in that office until his death. His lectures and writings, the latter chiefly in the *Christian Spectator* and the *Spirit of the Pilgrims*, gave rise to a memorable controversy between him and the more conservative theologians, notably Dr. Bennet Tyler. This controversy—known as that between Taylorism and Tylerism—beginning with Dr. T.'s *Concio ad Clerum* 1828, led 1833 to the founding (by his opponents) of East Windsor Theol. Seminary, since removed to Hartford.—His views may be briefly summed up as follows: sin is voluntary disobedience, and, as an underlying principle, it is a ruling purpose that prefers the world to God, and is resolvable into selfishness; in the human race, it was a certain but not necessary consequence of Adam's sin, and,

with that qualification, Adam was on trial for the race, but men do not inherit from him a disposition in itself sinful or one that desires to sin; there is power of contrary choice, and moral inability is a 'will not,' but holiness is so far dependent on Divine grace to induce it that one cannot convert himself; the world would have been better without sin, but not at the sacrifice of moral freedom; and the regeneration of a part of the race, rather than an election of individuals as such, was the Divine purpose, for wise and benevolent reasons.—Dr. Taylor died in New Haven. After his death were published *Practical Sermons* (1858); *Lectures on the Moral Government of God*, and *Essays, Lectures, etc.* (1859).

TAY'LOR, RICHARD: military officer: 1826, Jan. 27—1879, Apr. 12; b. New Orleans; only son of Pres. Zachary T. He graduated at Yale 1845; was in the Mexican war with his father; and then lived on a La. sugar estate till the civil war. He entered the Confederate army as col. of a La. regt.; attained the rank of lieut.-gen.; was at the first Bull Run, and with 'Stonewall' Jackson in Va.; defeated Gen. Banks in his Red River campaign; and surrendered to Gen. Canby 1865, May 4. After the war he engaged in politics, and pub. *Destruction and Reconstruction* (1879).

TAY'LOR, SAMUEL HARVEY, LL.D.: eminent teacher: 1807, Oct. 3—1871, Jan. 29; b. Derry, N. H. He graduated at Dartmouth Coll. 1832, and Andover Theol. Seminary 1837, becoming that year principal of Phillips Acad., and retaining the position till his death. He was noted in classical studies, and gave the Andover acad. wide reputation for thorough study. He was associate editor of the *Bibliotheca Sacra;* translated German text-books on Greek and Latin philology; published *Method of Classical Study* (1861); and compiled a volume of extracts on the value of such study, *Classical Study* (1870). He died in Andover.

TAY'LOR, TOM: dramatist: 1817–1880, July 12; b. Sunderland, England. In 1837 he entered Trinity Coll., Cambridge, graduating from it with high honors. He was for two years prof. of Eng. lit. in University Coll., London, admitted to the bar 1845; 1850 asst. sec. of the board of health; 1854 its sec.; a contributor to *Punch* for many years, and its editor 1873. Among his best-known works are: *Still Waters Run Deep; Our American Cousin; The Ticket-of-Leave Man; The Fool's Revenge;* and *The Overland Route.* He died at Wandsworth.

TAY'LOR, WILLIAM, D.D.: Methodist Episc. missionary bishop: b. Rockbridge co., Va., 1821, May 2. He graduated from a farm; became itinerant preacher 1843–49; missionary to Cal. 1849–56; evangelist in the e. states and Canada 1856–62, after which he labored in Great Britain, Australia, Tasmania, New Zealand, s. Africa (converting many Kafirs), Ceylon, India, Central America, Brazil, Chili, and Peru. In 1872 he established an independent mission in Bombay on the principle of self-support, which resulted in forming the South India and the Madras conferences, embracing missions in a number of important

centres. In Central and S. America, similar stations have been founded at Aspinwall, Callao, Iquique, Coquimbo, Santiago, Concepcion, Pernambuco, Para, etc. In 1884 he was elected missionary bp. of Africa, and established 36 missions, extending 1,200 m. on the Congo and 390 m. on the w. coast, including 70 missionaries supported by Methodists in America until rendered independent by school farms.—Bp. T. is author of *Seven Years of Street Preaching in San Francisco* (1856); *California Life Illustrated* (1858); *The Model Preacher* (1860); *Reconciliation, or How to Be Saved* (1867); *Infancy and Manhood of Christian Life;* and *Christian Adventures in S. Africa* (1867); *The Election of Grace* (1868); *Four Years' Campaign in India* (1875); *Our S. American Cousins* (1878); *Letters to a Quaker on Baptism* (1882); *Four Years of Self-supporting Missions in India* (1882); *Pauline Methods of Missionary Work* (1889).

TAY'LOR, WILLIAM JAMES ROMEYN, D.D.: clergyman of the Reformed Church: 1823, July 31—1891, Nov. 12: b. Schodack, N. Y. He graduated at Rutgers Coll. 1841, and New Brunswick Theol. Seminary 1844; was pastor of the Reformed church in New Durham, N. J., 1844–46, and of churches of the same denomination successively in Jersey City 1846–49, Schenectady 1849–52, another in Jersey City 1852–54, the Third Ref. Church in Philadelphia 1854–62, and a prominent Reformed church in Newark, N. J., after 1869, having in the interval been corr. sec. of the Amer. Bible Soc. He was editor of the *Christian Intelligencer* 1872–76. Besides addresses, sermons, hymns, etc., he published *The Bible in the Last Hundred Years* (1876); *Church Extension in Large Cities* (1880); and *Co-operation in Foreign Missions* (1884).

TAY'LOR, WILLIAM MACKERGO, D.D., LL.D.: Congregational minister: 1829, Oct. 23—1895, Feb. 8: b. Kilmarnock, Scotland. He graduated at the Univ. of Glasgow 1849, and at the United Presb. Theol. Seminary, Edinburgh, 1852. After two years' pastorate in Kilmaurs, near his birthplace, he began a new Presb. church enterprise on Derby Road, Liverpool, 1855, and made it successful. On a visit to the United States 1871, he supplied the pulpit of the Church of the Pilgrims, Brooklyn, and accepted a call to Broadway Tabernacle Church (Congl.) 1872, where he ministered to a great congregation. He was regarded as a model of what is called distinctively a sermonizer, presenting carefully arranged thought in lucid and forceful diction, and with touches of dramatic power. He edited *The Christian at Work* 1876–80, and his publications include: *Life Truths* (1862); *The Miracles, Helps to Faith* (1865); *The Lost Found and the Wanderer Restored* (1870); *Prayer and Business* (1873); *David, King of Israel* (1875); *Elijah, the Prophet* (1876); *The Ministry of the Word,* Yale lectures (1876); *Songs in the Night* (1877); *Peter, the Apostle* (1877); *Daniel, the Beloved* (1878); *Moses, the Lawgiver* (1879); *The Gospel Miracles in Their Relation to Christianity,* Princeton lectures (1880); *The Limitations of Life,* sermons (1880); *Paul, the Missionary* (1882); *Contrary Winds,* sermons (1883); *Jesus at the Well* (1884); *John Knox,* a biography (1885); *Joseph,*

the Prime Minister (1886); *The Parables of Our Saviour* (1886); *The Scottish Pulpit* (1887); *Ruth, the Gleaner, and Esther, the Queen* (1891).

TAY'LOR, WILLIAM ROGERS: naval officer: 1811, Nov. 7—1889, Apr. 14; b. Newport: son of Capt. William V. T., U.S.N. He entered the U. S. navy as midshipman 1828; was promoted passed midshipman 1834, lieut. 1840, commander 1855, capt. 1862, commodore 1866, and rear-admiral 1871, Jan. 19; and was retired 1873, Nov. 7. He distinguished himself in the Mexican and civil wars, was fleet-capt. during the attacks on Morris Island, was active in both attacks on Fort Fisher, and commanded the northern squadron of the Pacific fleet 1869–71 and the s. Atlantic squadron 1872–3.

TAY'LOR, ZACHARY: twelfth president of the United States; 1784, Nov. 24—1850, July 9 (pres. 1849–50); b. in Orange county, Va.; son of Col. Richard T., officer of the war of the revolution, and one of the first settlers of Louisville, Ky. To Louisville T. was taken in early childhood, and grew up to his 24th year, working on a plantation, with only the simplest rudiments of education. His elder brother had received a lieutenancy in the army, and died 1808, whereupon T. was appointed to the vacant commission. In 1810 he was promoted to a captaincy; and 1812, with 50 men, two-thirds of whom were ill with fever, he defended Fort Harrison, on the Wabash, against a large force of Indians, led by the famous chief Tecumseh (q.v.). Promoted to major for his gallantry, he was employed during the war in fighting the Indian allies of Great Britain. In 1822 he built Fort Jesup; 1832 he served as col. in the Black Hawk war; and 1836 was ordered to Fla., where he gained an important victory over the Seminole Indians at Okechobee, for which he was appointed brig.gen., and made commander of the U. S. forces in Fla. In 1840, having been appointed to command the s.w. dept., he bought an estate at Baton Rouge, La. 1845, Mar. 1, congress passed the resolution for the annexation of Texas, formerly a province of Mexico, and for some time an independent republic. Texas claimed the Rio Grande for her s.w. boundary; Mexico insisted that there could be no claim beyond the Nueces, and prepared to defend the disputed territory, if she could not reconquer the whole of Texas. Gen. T. was ordered to Corpus Christi, which he occupied in Nov. with a force of 4,000. 1846, Mar. 8, he moved toward the Rio Grande, across the disputed territory, and built Fort Brown, opposite and commanding the Mexican port of Matamoras. Gen. Ampudia, Mexican commander, demanded that he should retire beyond the Nueces, pending negotiations; and on the refusal of Gen. T., Ampudia's successor, Gen. Arista, crossed the Rio Grande with a force of 6,000. May 8 he was defeated at Palo Alto by Gen. T., with a force of 2,300; and a few days afterward was driven from a new position at Resaca de la Palma across the Rio Grande. War was declared by congress to exist by the act of Mexico; 50,000 volunteers were called for, T. made maj.gen.

reinforced, and ordered to invade Mexico. Sep. 9, with 6,625 men, he attacked Monterey, which was defended by about 10,000 regular troops. After 10 days' siege and 3 days' hard fighting, it capitulated. Gen. Scott, having been ordered to advance on the city of Mexico by Vera Cruz, withdrew a portion of the troops of Gen. T., leaving him only 5,000 volunteers and 500 regulars, chiefly flying artillery, to meet an army of 21,000, commanded by Pres. Santa Anna. T. took a strong position at Buena Vista, fought a desperate battle, and won a decided victory. This victory, against enormous odds, excited the utmost enthusiasm; and Gen. T., popularly called 'Old Rough and Ready,' was nominated by the whigs for pres. of the United States over Henry Clay, Daniel Webster, and Gen. Scott; and this 'ignorant frontier colonel, who had not voted for 40 years,' and was a slaveholder, was triumphantly elected over Gen. Cass, the democratic, and Martin Van Buren and Charles Francis Adams, free-soil candidates. Entering on the presidency 1849, he found a democratic majority in congress, with a small but vigorous free-soil party holding the balance of power, while the most exciting questions connected with the extension of slavery, as the admission of California, the settlement of the boundaries of Texas, the organization of the newly acquired Mexican territories, etc., were agitating the country, and threatening a disruption of the Union, postponed by the compromises introduced by Henry Clay. Worn down by the unaccustomed turmoil of politics, the rough, good-natured old soldier succumbed to an attack of bilious colic; and, after five days' sickness, died, 16 months after his inauguration.

TAYLOR'S THEOREM (named from its discoverer, Dr. Brook Taylor—q.v.): a general method for the algebraic development of a function of a quantity, x, in powers of its increment, h, and may be thus explained and illustrated. Let $f(x+h)$ denote *any* function of $x+h$ (subject to the limitations below); then $f(x+h)=f(x)+f'(x)h+f''(x)\frac{h^2}{1.2}+f'''(x)\frac{h^3}{1.2.3}+\ldots$, where $f(x)$ is the same function of x as $f(x+h)$ is of $x+h$, and $f'(x)$, $f''(x)$, etc., are the first, second, etc., differential coefficients of $f(x)$. By a supplementary theorem, due to Lagrange, the first to appreciate the value of Taylor's discovery, it was shown that the sum of all the terms of the series after n terms could be represented by $f\ (x+\theta h)\frac{h^n}{1.2\ldots n}$, where θ is some positive fraction less than unity. The theorem supposes that between certain limits, indicated by $h=o$, and $h=$ some finite quantity, neither $f(x)$ nor any of its derived functions vanish, or all of them do not become infinite; and the cases in which these conditions are not satisfied are often spoken of as instances of the 'failure of Taylor's theorem.' An important particular case of this theorem, known as *Maclaurin's* or (more properly) *Stirling's Theorem*, was independently discovered; it is

that case of the general theorem in which the various functions of x are made functions of zero, and is written $f(o+h) = f(o) + f'(o)h + f''(o)\frac{h^2}{1.2} +$, etc. The best illustrations of these theoerms are the binomial, exponential, logarithmic, and circular series: thus, if the function be $(x+h)^n$, then $f(x) = x^n$, $f'(x) = nx^{n-1}$, $f''(x) = n(n-1)x^{n-2}$, etc.; and by substitution of these values we obtain Newton's *binomial* theorem; if the function be a^{x+h}, Taylor's series gives us as its equivalent $a^x(1 + h \,.\, \log.\ a + \frac{h^2}{1.2}(\log.\ a)^2 + \ldots.)$; and Maclaurin's gives $a^h = 1 + h \,.\, \log.\ a + \frac{h^2}{1.2}(\log.\ a)^2 + \ldots.$, which latter is the *exponential* theorem, and may be obtained from Taylor's series by division; if the function be log. $(1 + x + h)$, (log. $\overline{x+h}$ being one of the cases in which Taylor's theorem fails), then Maclaurin's series gives the *logarithmic* theorem, log. $(1+h) = h - \frac{h^2}{2} + \frac{h^3}{3}, -$, etc.; and the same theorem gives the various series expressing the values of sin. h, cos. h, sin. ^{-1}h, etc., etc. The history of this celebrated theorem is remarkable. On the first publication of the *Methodus Incrementorum*, it was entirely neglected by Leibnitz. The theorem never appeared in any of the works on the calculus published before D'Alembert's *Recherches*, and after that it was given only in the French *Encyclopædia;* but neither D'Alembert nor Condorcet seems to have known that it was Taylor's, or to have appreciated its importance; and it was not till Lagrange, in *Berlin Memoirs*, 1772, gave the name of its author, and proposed to make it the foundation of the differential calculus, that it assumed the important position which was its right.

TAZEWELL, *tăz'wĕl*, HENRY: 1753–1799, Jan. 24; b. Brunswick co., Va.: jurist. He was educated at William and Mary College; admitted to the bar; member of the house of burgesses 1775–85; elected judge of the supreme court 1785, and judge of the court of appeals 1793; and was U. S. senator from 1794 till his death, being pres. of the senate 1795. He led the republican opposition to Jay's English treaty, and urged the abolition in Va. of the laws of primogeniture and entail.

TAZZA, n. *tăt'zä* [It.]: an ornamental cup or vase having a foot and handles and a large flat top.

T-BANDAGE, n. *tē'bănd-ĭj:* surgical bandage shaped like a T, and consisting of a strip of linen attached to another strip at right angles; used in supporting dressings in diseases of the perinæum, groin, etc.

TCHAD, *chád* (or TSAD, *tsâd*), LAKE: large lake in Sudan, n. Africa, lat. 12° 30′—14° 30′ n., long. 13°—15° 30′ e. Its size varies with the season; it has an area of 10,000 sq. m. in the dry season, and is sometimes four or five times as large in the rainy months. According to Rohlfs, it is 1,150 ft. above sea-level. The shores are low and un-

attractive; and a strip of swampy ground surrounds the fine open sheet of water which is the actual T., whose margin is lined by papyrus and tall reeds, 10 to 14 ft. in height. Its depth in ordinary years is 8 to 15 ft., but in some years the waters rise much higher; and of the islands, of which there are many densely peopled, only the more elevated afford secure abodes. River-horses and crocodiles swarm in the lake, and fish and water-fowl are abundant. There are several affluents. From the w., the large river Yaobe enters; and from the s., the Shari, which in its lower course is more than 1,800 ft. wide. Lake T., whose waters are perfectly fresh, has no regular outlet; but Dr. Nachtigal has proved that it sometimes overflows toward a great depressed plain 300 m. northeast.

TCHELYUSKIN, *chĕl-yûs'kĭn*, CAPE, formerly CAPE SEVERO: northernmost point of Asia. It was rounded by Nordenskjöld and his party 1878, and found by them to be in lat. 77° 41′ north.

TCHEREMISSES, *chĕr'ĕ-mĭs-ĕs:* branch of the Finnish race (see FINNS), inhabiting the country between the Volga and the Viatka in Russia, also the region of the Kama and the Bielaja; distributed in the governments Kazan, Kostroma, and Viatka. Prof. Smirnoff, of Kazan Univ., computes their number at 321,591. Their country is in 2 distinct regions—the 'mountain land' stretching from Vassilssursk on the w. to Ilyinka on the e., and the much more extensive 'meadow land' bounded w. by the Vetluga, Yuronga, and Usta, n. by the Viatka, e. by the Ilet, s. by the Volga and lower Kama. The mountain land is well clothed with pine and fir, and has very fertile soil; its people are noted for fine and vigorous physique. The meadow land is still mostly covered with forests, and its inhabitants subsist chiefly by the chase; the mountaineers practice agriculture. Life among the T. is still very primitive. Polygamy is practiced by the pagan T., and the marriage customs recall the practice of having wives in common. Food is set in the coffins of the dead. The Tcheremiss gods are many—a god of heaven, of the dawn, the ruler of the world, the mother of the sun, and many more. Offerings to the gods consist of the head or the heart of a victim; and for the head or the heart, cakes shaped like a horse are substituted in some districts.

TCHERKASK, STAROI, *stâ-roy' chĕr-kâsk'* (Old Tcherkask): a town of south Russia, formerly the capital of the Don Cossacks; stands on the right bank of the Don, 12 m. s. of Novotcherkask, the present capital. Pop. 15,000.

TCHERKASY, *chĕr-kâ'sē:* town of Russia, govt. of Kiev, 100 m. s.e. of the town of Kiev, on the Dnieper. Pop. (1880) 14,000.

TCHORNOZEM, n. *chŏr'nō-zĕm* [Russ. *tchornie*, black; *zem*, earth]: the fertile black earth of the south of Russia, which covers every other deposit of the Aralo-Caspian plain.

TCHUDI, n. *chû'dē* [Russ.]: Russian name for the Finnic races in n.w. Russia, especially the Finns, Esthonians Livonians, and Laplanders.

TEA, n. *tē* [F. *thé;* Russ. *tshai*—from Chin. *cha;* prov. Chin. *te* (pron. *tā*)]: dried rolled leaves of a shrub or small tree (see below) of several species of the genus *Thèa*, ord. *Ternstrœmiăcèæ*, extensively cultivated in China and surrounding countries: an infusion of the dried leaves of the tea-plant in boiling water; the afternoon repast at which tea is drunk; by extension, an infusion of some other substance, e.g., beef-*tea*. TEA-CANISTER, small box for keeping tea intended for regular use. TEACUP, small vessel from which an infusion of tea is drunk. TEA-DEALER, one who sells tea. TEAPOT, small kettle or pot, with handle and spout, in which tea is infused. TEA-SERVICE, complete set of articles for the tea-table. TEASPOON, small spoon for stirring the infusion of tea and mixing in it the sugar, etc. TEA-URN, large ornamental vessel, containing hot water, for use on the tea-table.

TEA: an important article of commerce, the product of a shrubby plant of the genus *Thea*, nat. ord. *Ternstrœmiaceæ*, but so nearly allied to the genus *Camellia* (q.v.), of the same order, as to be placed by some botanists in that genus. The genus *Thea* seems to derive its importance entirely from a single species (*T. Sinensis*, by some called *Camellia theifera*), an evergreen shrub, which in cultivation grows to a height of 3–5 feet, with numerous branches and lanceolate leaves 2–4 inches long. The flowers grow singly or two or three together in the axils of the leaves; they are rather large, white, and fragrant, with 5-parted calyx, 6–9 petals, and many stamens. By cultivation for many centuries, numerous varieties of this plant have been produced in China, some of which have been reckoned as distinct species, particularly *T. viridis*, formerly supposed to yield green tea, *T. Bohea*, formerly supposed to yield black tea, and *T. stricta*. Of these, the first named has the longest, and the last has the shortest leaves. The Assam tea-plant (*T. Assamensis*), indigenous in Assam, is regarded by some as the parent species of the cultivated varieties. It grows to a height of 15–20 feet.

The cultivation of tea in China is chiefly confined to the provinces of Hûpih, Hû-nan, Ngan-hwuy, Kiang-si, Chĕh-kiang, Fŭh-kien (including Formosa), and Kwang-tûng, which produce the export varieties of tea. Tea for domestic use is, however, cultivated both in more southern and more northern regions, the celebrated Pû-erh tea, for example, being a product of a prefecture of the same name in the extreme s.w. of Yun-nan. The plant is to be accounted subtropical, but bears a tropical climate well, and can also accommodate itself to cold winters. In few of the countries into which it has been introduced, however, is the flavor of the dried leaf such as it is in China. The Chinese cultivate it chiefly on the s. slopes of hills. A new plantation is made by sowing the seed in holes at proper distances, two or three seeds being put into a hole to secure a plant. The first crop is obtained in the third year, when the shrub is not full-grown. When about seven years old, it yields only a scanty crop of hard leaves, and is cut down, when new shoots rise from the root and bear fine leaves in

abundance. This is repeated from time to time, till the plant dies at about the age of 30 years. The plant requires a well-manured or very rich soil, and the spaces between the plants (4 ft.) must be kept in good order and free from weeds. The farms always occupy the hillsides, where the soil is deep and well drained. Although an evergreen, the leaves can be gathered only at certain seasons: the first is in April, when the new leaves begin to burst from the buds; and some of these in their most tender state are gathered and made into young hyson of the finest quality—so fine, indeed, that it has rarely been exported, because it is said to lose flavor by the sea-voyage. Much is, however, sent overland to Russia, where it fetches a very high price. The ordinary picking begins just after the summer rains are over, at the beginning of May; and later in the season a third picking takes place, whose product is inferior, and used only by the poorer classes. The later gatherings are more bitter and woody than the earlier, and yield less soluble matter to water. The leaves freshly plucked possess nothing of the odor or flavor of the dried leaves, these properties being developed by the roasting which the leaves undergo in the process of drying. Moreover, different qualities of tea are prepared from the same leaves, which may be made to yield green or black teas at will.

Much mystery and error long existed as to the species producing the tea of commerce. By many it was said that the qualities known as black teas were produced by the species known to botanists as *Thea Bohea*, and the green teas from *T. viridis*. It is now generally recognized, however, that either black or green T. can be made from leaves of the same plant, the essential difference being in the methods of preparation. Black T. is sun-dried soon after being picked and before roasting, while green T. is roasted immediately after being picked and is not exposed to the sun at all. It is even said that in picking the leaves to be made into the choicest green T. the pickers stand with their backs to the sun, so as to prevent the action of the sun's rays on the leaf.

For the processes for obtaining the green and the black teas, see Fortune's *Tea Countries of China*, Johnston's *Chemistry of Common Life*, and Money's *Cultivation and Manufacture of Tea* (3d. ed. 1879). It is sufficient here to remark, *first*, that, in drying, the leaves are roasted and scorched in such a way as necessarily to induce many chemical changes, the result being to produce the varieties of flavor, odor, and taste by which the different kinds of teas are distinguished; *secondly*, that the different colors of green and black are due to the mode in which the leaves are treated. For *green teas*, the leaves are roasted in pans almost immediately after they are gathered. After about five minutes' roasting, during which they make a cracking noise, become moist and flaccid, and give out a good deal of vapor, they are placed on the rolling-table, and rolled with the hands. They are then returned to the pans, and kept in motion by the hands: in about an hour, or rather more, they are well dried, and their color, which is dull green, but becomes

brighter afterward, has become *fixed.* The essential part of the whole operation is now over, nothing more being required than to sift and re-fire the material. For *black teas*, the leaves are spread out in the air for some time after they are gathered; then tossed about till they become flaccid; next roasted for a few minutes, and rolled, after which they are exposed to the air for a few hours in a soft and moist state; and lastly they are dried slowly over charcoal fires, till the black color is fairly brought out. The dark color and distinguishing flavor of black tea seem due to the long exposure to the atmosphere in the process of drying, and to the oxygen of the air acting rapidly on the juices of the leaf, and especially on the astringent principle during this exposure. To give special scents to different varieties of tea, numerous odoriferous plants are employed in different parts of China; the cowslip-colored blossoms of the sweet-scented olive (*Olea fragrans*) communicate an especially fragrant scent.

The adulteration of tea, formerly common, is now seldom resorted to, on account of the stringency of the inspection laws of the importing countries. The Chinese 'face' or give an artificial coloring to the green teas sent to Europe because it pleases the eye, but the coloring matter is innocuous, and is not produced by heating over copper plates. Prussian blue in very minute proportion, and a species of native indigo and gypsum, are the real materials employed.

From China and Corea the cultivation and use of tea spread in the 9th c. to Japan, where it is now used as universally as in China, and from which large quantities are exported, chiefly to the United States.

In 1826 tea was found growing indigenously in Assam; in 1834 the Chinese tea-plant was introduced; government established experimental plantations in Assam and in the sub-Himalayan districts of Kumaon and Garhwal; and since 1851, tea has been grown on a large scale in Assam, and less extensively in Bengal, N. W. Provinces, Punjab, and Madras. The export of Indian tea (1883) was nearly 60,000,000 lbs. (out of a total of 222,262,000 lbs.; value £11,543,000). In India three kinds of tea are grown—Assam, China, and Hybrid; the latter, a cross between the two others, being the most approved. India tea is better than much of the Chinese growth, and of late that exported by Ceylon in rapidly increasing quantities is preferred to Indian teas. The development of the Ceylon tea trade has been very great since the failure of coffee there; Java and Borneo also export tea. On the Brazilian highlands most excellent tea grows in large quantities. It is grown also in the Philippines, s. California, New Zealand, Caucasia, and on a small scale in Sicily—near Messina.

The tea of commerce is known as black T., green T., and brick T. By the Chinese, black tea is called *hung cha* or 'red' tea. Its chief varieties or brands are: (1) *Bohea*, from *boo-he*, the local pronunciation of *Woo-yi*, the name of two hills in Fŭh-kien where it is grown; (2) *Congou*, from Chinese *kûng-fû*, labor (locally pronounced *kong-hoo*), on

account of the labor of preparing it; (3) *Souchong*, Cantonese pronunciation of *siao chung*, 'little sorts'; (4) *Caper*, called in China *shwang-chi*, 'doubly manipulated.' The name caper is probably owing to the resemblance of the leaf to the flower-bud of the caper-bush; (5) *Oolong*, from Chinese *woo-loong*, 'black dragon'; (6) *Pekoe*, from *pak-ho*, Cantonese pronunciation of Chinese *pih-hao*, 'white down,' because picked before leaf-bud has expanded, and while covered with down—sometimes called Flowery Pekoe.

Of green teas, the principal varieties are: (1) *Twankay*, from *tun-khē*, an important tea-mark in the province of Ngan-hwuy; (2) *Hyson*, from *hē-chun*, 'glad spring.' Other hysons are: *young hyson*, and *hyson-skin;* (3) *Imperial:* called 'large pearls' by the Chinese, because made up into little balls like a pea; (4) *Gunpowder*, or 'little pearls,' the finest variety of green tea. As a rule these names have been applied to corresponding brands of Indian, Japanese, and Javanese teas.

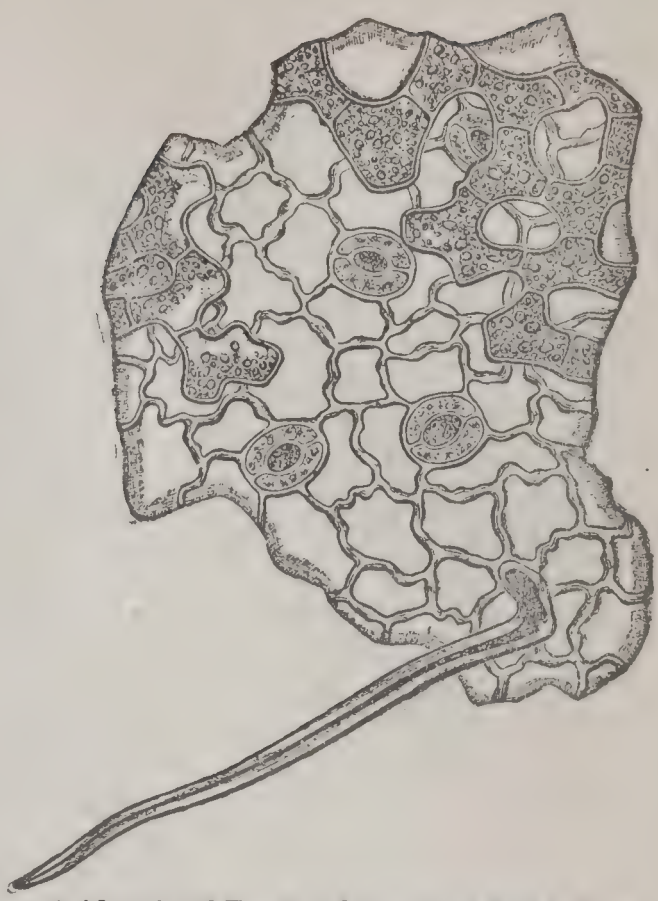
Brick Tea is a common kind prepared in China by softening refuse leaves, twigs, etc., with boiling water and then pressing the compound into slabs like bricks. It is used in great quantity in Mongolia and Siberia, where it is used also as a medium of exchange.

The use of the infusion of the leaves of tea as a beverage is general in s.e. Asia, and has become prevalent among the English-speaking people of the world, as well as among Americans, and the Dutch. In Scandinavia, tea is much used by all who can afford it. In other parts of Europe, the use of tea is much less general, and is chiefly confined to maritime districts, towns, and the wealthy. The finest varieties of black tea go to Russia—formerly overland, but now by the Black Sea route. The Chinese, Japanese, and other eastern people use neither sugar nor milk in their tea—Russians flavor it with lemons.

The *substitutes* for tea, in countries where it is difficult to obtain it, are of two sorts: those which contain theine, and which consequently have the same stimulating effect; and those destitute of theine, and resembling the true tea in only flavor or smell, or possessing some other stimulating principle. Of those possessing theine are—(1) Maté (q.v.); (2) Guarana (q.v.): so rich is this material in theine that it has lately been used for obtaining that principle; and it has been introduced into Austria and France as a powerful medicine; (3) Coffee-leaves, occasionally prepared as a substitute in the W. Indies: they would be more generally used were it not for the disagreeable smell of the infusion; (4) the Kola-nut, whose active principle has been ascertained to be theine.

The second class, or those which do not possess theine, are very numerous; but only a few are important from their general use in the countries producing them. These are Siberian tea—leaves of *Saxifraga crassifolia;* Appalachian tea—leaves of *Prinos glabra;* Labrador tea—leaves of *Ledum buxifolium;* Chilian tea—leaves of *Eugenia ugni;* Trinidad pimento tea—leaves of *Eugenia pimenta;* and leaves of the Partridge-berry, used in parts of N. America.

Tea Leaf—full size.



Epidermis of Tea Leaf, under side; highly magnified.

Section through **Tea Leaf.**

Tea Plant (*The Sinensis*).

The Faham tea of Mauritius, and a great many more, are properly classed as medicines, rather than as ordinary beverages; though they are generally classed with the substitutes for ordinary tea.

History and Commerce.—All that can be affirmed regarding the early history of this beverage is, that it appears to have been used for ages in China, where it is believed by the natives to be indigenous. It became known to Europeans at the end of the 16th c. It is mentioned by the Portuguese writer Maffei in his *Historiæ Indicæ* as a product of both China and Japan. The first reference to it by a native of Britian is in a letter dated 1615, June 27, written by a Mr. Wickham, which is in the records of the E. India Company; and it is noticeable that the Portuguese and English writers referred to use their own rendering of the native name *cha*. Maffei calls it *chia*, and Wickham, *chaw*. From this time, it became gradually known to the wealthy inhabitants of London, in the form of occasional presents of small quantities from India, obtained from China, or by small lots in the markets from time to time, but always exorbitantly dear, fetching sometimes as much as £10 the lb., and never less than £5. A rather large consignment was received 1657; this fell into the hands of a thriving London merchant, Thomas Garraway, who established a house for selling the prepared beverage; and that house, under the name 'Garraway's Coffee-house,' is still a famous establishment. The imports of tea into the United Kingdom in 1889 amounted to 222,147,661 lbs. (value $49,-939,835), of which 36,064,040 lbs. (value $8,711,025) were re-exported. The imports of tea into the United States during year ending 1890, June 30, were 83,886,829 lbs., valued at $12,317,493; exports, 391,873 lbs., valued at $97,-850. In 1880–90 the imports ranged from 67,665,910 lbs. (1884) to 89,831,221 lbs. (1887); the exports from 383,731 lbs. (1889) to 3,942,645 lbs. (1902); and the net imports from 60,061,944 lbs. (1884) to 108,574,905 lbs. (1902).

Tea, in its Chemical, Physiological, and Medicinal Relations.—On submitting the ordinary commercial tea to analysis, we find that it contains (1) a volatile or essential oil; (2) theine or Caffeine (q.v.); (3) a nitrogenous compound analogous to caseine or gluten; (4) a modification of tannin; besides gum, sugar, starch, fat, woody fibre, salts, etc. The following comparative analyses of tea, coffee, and the dry kola-nut, show how nearly they contain the same organic constituents:

	100 Parts of Tea contain	00 Parts of Coffee contain	100 Parts of Kola-nuts contain
Water	5	12	13·65
Theine	3	1·75	2·13
Caseine	15	13	6·33
Gum	18	9	10·67
Sugar	3	6·5	
Starch	a trace	a trace	42·00
Tannin	26·25	4	....
Aromatic oil	0·75	0·002	1·52
Fat	4	12	
Fibre	20	35	20·00
Mineral substances	5	6·7	3·20

The volatile oil gives to tea its peculiar aroma and flavor. The proportion in which it exists is, according to Miller, about 0·79 per cent. in green, and 0·6 per cent. in black tea. It may be obtained by distilling the tea with water, and is found to exert a powerfully stimulating and intoxicating effect. In China, tea is seldom used till it is a year old, on account of the well-known intoxicating effects of new tea, due probably to the larger proportion of essential oil which it usually contains. The headache and giddiness of which tea-tasters complain, and the attacks of paralysis to which, after a few years, persons employed in packing tea are found liable, are due to the action of this oil, which, according to Johnston, 'does not exist in the natural leaf, but is produced during the process of drying and roasting.'—*Chemistry of Common Life*, I.

The theine or *caffeine* varies considerably in different kinds of tea. It may readily be obtained by the following simple experiment. When dry finely powdered tea leaves, or a dried watery extract of the leaves, are put on a watch-glass covered with a paper cone, and the whole is placed on a hot plate, or exposed to the heat of a spirit-lamp, a white vapor gradually rises and condenses on the interior of the cone, in the form of small crystals, which consist of theine. As it has no odor, and only a slightly bitter taste, it obviously has little to do with the taste or flavor of the tea from which it is extracted; it is, however, to the presence of this ingredient that the peculiar physiological action of tea on the animal economy is due. This substance is represented by the formula $C_8H_{10}N_4O_2$, and is remarkable for the large quantity of nitrogen, more than 33 per cent., which it contains—nearly double the amount in albumen, fibrine, etc. It is remarkable also as occurring in plants very unlike each other and growing in remote countries, which have by instinct been selected by different nations for the purpose of yielding a slightly exciting and very refreshing beverage (see above). If 6-8 grains of theine (or $\frac{2}{3}$ oz. of the tea containing it) be taken, there is general excitement of the circulation, the heart beating more strongly, and the pulse becoming more rapid; tremblings also come on, and there is constant desire to relieve the bladder. At the same time, the imagination is excited, the mind begins to wander, visions appear, and a peculiar intoxication comes on; the symptoms finally terminating, after a prolonged vigil, in a sleep arising from exhaustion. It is not definitely known what changes theine undergoes in the animal economy. The *nitrogenous compound* allied to caseine or gluten constitutes about 15 per cent. of the weight of the leaf. As hot water extracts very little of this substance, a large quantity of this nutritious matter, which forms about 33 per cent. of the dried spent leaves, is thrown away. Much of it might be dissolved if a little carbonate of soda were added to the boiling water with which the tea is made. To the *astringent principle*, or *tannin*, which forms 13 to 18 per cent. of the dried leaf, tea owes its astringent taste, its constipating effect on the bowels, and its property of communicating an ink-like color to water con-

taining salts of iron Whether this ingredient contributes in any degree to the exhilarating, satisfying, or narcotic action of tea, is not known.

It is usual to judge of the quality of a tea by its aroma, and by the flavor and color of the infusion which it yields; but to these tests should be added the determination of the amount of soluble matter which it readily yields to boiling water. It is stated by Miller that our ordinary tea contains about 45 per cent. of soluble matter; but the independent researches of Davy and Peligot show that boiling water seldom extracts more than one-third of the weight of the dry tea; while in J. Lehmann's experiments only one-sixth (15·5 per cent.) was extracted. Good tea should, moreover, not yield more than 5 or 6 per cent. of ash when incinerated; and a portion of this is due probably to the coloring matter which the Chinese add to the green teas prepared for the foreign market. For this purpose, they used formerly a mixture of Prussian blue and gypsum; but indigo is now commonly used, which is probably harmless. Drinkers of green tea who wish to know which of these adulterations they are swallowing may easily determine the point by the following simple experiment: 'If a portion of the tea be shaken with cold water, and thrown upon a bit of thin muslin, the fine coloring matter will pass through the muslin, and settle to the bottom of the water. When the water is poured off, the blue matter may be treated with chlorine, or a solution of chloride of lime. If it is bleached, it is indigo; if potash makes it brown, and afterward a few drops of sulphuric acid make it blue again, it is Prussian blue.'—Prof. Johnston.

Much has been written regarding the dietetic and medical uses of tea. While some physicians have overpraised its value, others have regarded it as the source of numerous diseases, especially of the nervous system. Experience has proved that T. sustains the system without causing subsequent exhaustion and collapse. The pulse is a little quickened. The amount of pulmonary carbonic acid is, according to Dr. E. Smith, increased. The action of the skin is increased; that of the bowels lessened. The kidney excretion is little affected; perhaps the urea is a little lessened, but this is uncertain, the evidence with regard to the urine being very contradictory. Dr. Parkes regards it as a most useful article of diet for soldiers, and it is well known that cold tea is frequently preferred to beer or cider by sportsmen, reapers, and others engaged in laborious work in hot weather. As a general rule, tea is very injurious to young children, and is not a suitable drink till growth is completed; and adults of irritable constitution or leucophlegmatic temperament often suffer from its use. Those with whom tea does not agree will generally find cocoa the best substitute. Old and infirm persons usually derive more benefit and personal comfort from tea than from any other beverage of its class. In fevers tea, in the form of a cold weak infusion, is often of great service. In persons of gouty and rheumatic tendency, and especially in such as are of the *Lithic Acid Diathesis* (q.v.), weak tea without

sugar, and with very little milk, is the best form of ordinary drink. In some forms of diseased heart, tea is a useful sedative, while in other cases it is positively injurious; and a cup of strong green tea, especially if without sugar or milk, will often remove a severe nervous headache. It is nearly as powerful an antidote in cases of opium-poisoning as coffee; and very strong tea has been the means of preserving life in cases of poisoning by tartar emetic, the tannin being in these cases the active agent. It is impossible to speak too strongly against the habit occasionally adopted by students of keeping off their natural sleep by frequent use of strong tea: such a habit is certain to lead to the destruction of both bodily and mental vigor. See Money, *The Cultivation and Manufacture of Tea* (3d ed. 1879).

TEACH, v. *tēch* [AS. *tæcan*, to instruct: Goth. *gateihan*, to announce: Ger. *zeigen*, to show: Gael. *teagasg*, instruction: Skr. *ádich*, to teach]: to impart knowledge to; instruct; accustom; inform; tell or show; suggest to the mind; perform the office of instructor; to instruct for a livelihood. TEACH'ING, imp.: N. the act of instructing; instruction. TAUGHT, pt. pp. *tawt*, instructed; informed. TEACH'ER, n. *-ér*, one who teaches; an instructor. TEACHABLE, a. *tēch'ā-bl*, that may be taught; apt or willing to learn; docile. TEACH'ABLENESS, n. *-nès*, the quality of being teachable; willingness or readiness to be instructed; docility; capacity to learn.—SYN. of 'teach': to inform; instruct; train; acquaint; apprise; advise; tell; guide; admonish; counsel.

TEACH, or TEACHE, n. *tēch:* in *sugar-works*, the last receptacle in which the cane-juice is boiled.

TEACHING OF THE TWELVE APOSTLES—TEACHING OF THE LORD, THROUGH THE TWELVE APOSTLES, TO THE NATIONS: double title prefixed to a very ancient and highly important MS., found 1873 by Philotheos Bryennios, Metropolitan of Nicomedia, in the library of the Monastery of the Most Holy Sepulchre in the Greek quarter of Constantinople. As the monastery is connected with the patriarchate of Jerusalem, Bryennios called it the Jerusalem Codex. No other existing copy is known. It consists of 318 lines in Greek, covering five leaves of vellum 7½ in. by 6 in., and accompanying 115 other leaves which contain Chrysostom's Synopsis of the Old and New Testaments, Epistle of Barnabas, two epistles of Clement of Rome, Epistle of Mary of Cassobelæ to Ignatius, twelve epistles of Ignatius, the genealogy of Joseph, etc., all by one hand; and it is dated and signed the year 6564 'by the hand of Leon, scribe and sinner.' The Greek reckoning of the creation being B.C. 5508, the date of the copy would be A.D. 1056; and the original document (of which this, by comparison with portions of it incorporated into very early Christian writings, e.g., the Epistle of Barnabas, etc., is evidently a trustworthy transmission) is referred to about the beginning of the 2d c.—the approximate date being fixed by quotations from it in documents of known early date. Thus the original goes back to about the date

of the death of the Apostle John, but there is no evidence in the document that the author was acquainted with the books of the New Testament, except the gospel of Matthew and perhaps that of Luke; his purely practical purpose, quite aside from historical and doctrinal, would not bring other N. Test. books into view. He addresses the 'nations,' i.e., Gentile Christians; and his scope is ethical chiefly. There is first a description of the way of life as involving love to God and one's neighbor, with injunctions against various offenses, and the means of cultivating specified virtues by piety toward God, keeping the Lord's commandments, heeding instruction, confessing sin. The way of death is then described, with full mention of crimes, vices, sins, and evil dispositions. Following this are warnings against false teachers and eating food offered to idols; rules for the Christian community in respect to the observance of baptism, fasting, prayer, the Lord's Day, the eucharist, the reception of teachers, apostles, prophets and strangers; the maintenance of the prophets; and the appointment 'for yourselves' of bishops and deacons. Then there are exhortations to mutual reproof, discipline, obedience, closing with the duty of watchfulness for the Lord's coming, and a description of the 'last time' before the coming of the Lord—the language much like that of the New Test., referring to false prophets, hatred, lawlessness, persecutions; 'then shall appear the world-deceiver as the Son of God, and shall do signs and wonders, and the earth shall be given into his hands, and he shall commit iniquities which have never yet been done since the beginning; then all created men shall come into the fire of trial.'

What are termed the evangelical doctrines are implied rather than expressed. In respect to observances, the fourth and sixth days of the week are recommended for fasting; the Lord's Prayer is given in full, and as an exercise thrice a day; the Lord's Day is to be observed with assembling, breaking bread, thanksgiving, and confession; the eucharist only by baptized persons; baptism in warm water if there be none cold, and, 'if neither,' then by pouring water on the head. All directions for these observances seem to be given to the body of believers; and the service of officers appears as that of teaching, apostles being itinerant teachers. The author of the document prescribes the first six sections, preceding the subject of Christian rites, as a lesson to be read to candidates for baptism.—For text, translation, and a full discussion, see *Teaching of the Twelve Apostles*, by Roswell D. Hitchcock and Francis Brown, 1885, revised and enlarged ed.; for text and translation in cheaper form, same title, ed. by J. Fitzgerald, New York, John B. Alden; translations also in the *Andover Review*, *Journal of Christian Philosophy*, *Churchman*, etc. (all 1884). Of the many critics of the document, some speak of it as representing a germinal or embryonic stage of Christianity; but it is a question whether the teaching and ordering of the Twelve Apostles, commissioned to establish the religion, are to be brought under the botanical and zoological conceptions now so generally applied.

TEAK, *tēk:* name of two kinds of timber, valuable for ship-building and other purposes—one known as INDIAN T., the other as AFRICAN T. The trees which produce them belong to very different orders.—INDIAN T. (*Tectona grandis*) is a tree of nat. order *Verbenaceæ.* It is found in mountainous parts of Malabar, and elsewhere in Hindustan, and in the Eastern Peninsula, Ceylon, Java, etc. It was early introduced into parts of India, in which it is not indigenous, but where it is known to have been in use more than 2,000 years. It takes 60 or 80 years to grow to a large size. It is a beautiful tree, attaining a height sometimes even of 200 ft., and rising above all the other trees of the E. Indian forests. It has deciduous oval leaves 12–24 inches long, covered with rough points; great panicles of white flowers, with 5-6-cleft corolla, and 4-celled drupes about the size of a hazel-nut. Its flowers are used medicinally in cases of retention of urine, and its leaves by the Malays in cholera. Silk and cotton stuffs are dyed purple by the leaves. The timber is the most valuable produced in the E. Indies; it is light and easily worked, strong, durable, and not liable to attacks of insects. It abounds in silex, and resembles coarse mahogany. It is extensively used for ship-building, for which purpose it is exported. All the finest ships built in India, and many built in England, are of teak. The most extensive T. forests are in Pegu. The T. generally grows in clumps in forests more than it forms forests of itself.—AFRICAN T., sometimes called AFRICAN OAK, is a timber similar to E. Indian teak: it is now believed to be the product of *Oldfieldia Africana*, a tree of nat. order *Euphorbiaceæ.*

TEAL, n. *tēl* [Dut. *teling*]: a small species of wild duck, of the genus *Querquedula* (or *Nettion*) and family *Anatidæ*, with very slightly lobed hind toe, narrow bill, as long as the head, the sides nearly parallel, or widening a little at the end, the wings pointed, the tail moderately large and wedge-shaped. Teal generally frequent rivers and lakes, feeding principally at night on aquatic insects, worms, mollusks, seeds, etc. The COMMON T. (*Q.* or *N. crecca*) is plentiful in most parts of Europe, and is occasionally but rarely seen in N. America. Its whole length is about 14 inches. It is a very beautiful bird; the head of the male brownish red, the body transversely undulated with dusky lines, a white line above, and another beneath the eye, the speculum black and green. It makes its nest on the margins of lakes or rivers, of decayed vegetable matter lined with down, and lays eight or ten eggs. Its flesh is extremely delicate. It was domesticated by the ancient Romans, and seems capable of being advantageously introduced into poultry-yards.—The GARGANEY (q.v.) is a British species.—The GREEN-WINGED T. (*Q.* or *N. Carolinensis*) of N. America is very similar to the Common T., but it is at once distinguished by a white crescent in front of the bend of the wings: it is occasionally seen in Europe. In its summer migrations, it visits far n. regions.—The BLUE-WINGED T. (*Q. discors*) is very abundant in many parts of N. America: see BLUE-WING.

TEAM, n. *tēm* [Icel. *taumr*, a rein, a bridle: Sw. *töm;* Dan. *tömme*, a rein: Low Ger. *toom*, a rein, progeny: AS. *teám*, a family]: two or more horses or other beasts of burden harnessed together for drawing; a working body of men, as of cricketers or base-ball players; in *OE.*, a litter; a brood: V. in *OE.*, to join together in a team. TEAM'-STER, n. *-stĕr*, one who drives a team.

TEAPOY, n. *tē'poy* [Anglo-Indian, *tipai*, corruption of Pers. *cipai*]: three-legged table with a lifting top, inclosing tea-caddies, or a small stand for holding tea-cup, sugar-basin, cream-jug, etc.

TEAR, n. *tēr* [AS. *tær;* Goth. *tagr;* Dan. *taar;* Icel. *tár;* Gr. *dakru;* Gael. *deur*, a tear]: one of the fluid drops which flow or fall from the eyes through excessive grief, joy, or as a result of irritation or injury (see LACHRYMAL ORGANS): any moisture trickling in drops. TEAR'FUL, a. *-fŭl*, full of tears; shedding tears. TEAR'LESS, a. *-lĕs*, without tears; unfeeling. TEAR'FULLY, ad. *-lĭ*. TEAR'-FULNESS, n. *-nĕs*.

TEAR, v. *tär* [Goth. *gatairan*, to break up, to destroy: Low Ger. *teren;* Icel. *tæra*, to consume: Ger. *zerren*, to tear: Russ. *dira*, a rent]: to separate by violence; rupture; shatter; divide by pulling; rend; remove or take away by violence, or by some degree of force; to go very fast, as to *tear* along; to rave; to rage; to agitate: N. a rent; a rupture; a separation by violence. TEAR'ING, imp.: ADJ. raving; noisy; impetuous; making a violent rent. TORE, pt. *tōr*, or TARE, pt. *tär*, did tear. TORN, pp. *tōrn:* ADJ. ruptured; pulled asunder with some degree of violence. TEAR'-ER, n. *-ĕr*, one who tears. TO TEAR FROM, to separate and take away by force. TO TEAR OFF, to pull off by violence. TO TEAR OUT, to pull out by violence. TO TEAR UP, to rip up; to pull to pieces.—SYN. of 'tear, v.': to burst; rend; crack; break; split; lacerate; wound; shatter.

TEAR'PITS: see DEER.

TEASE, v. *tēz* [O. Dut. *teesen*, to pick, to pull about: Ger. *zausen*, to pick or tease wool: Bav. *zaisel*, a teasel: Scot. *tousel*, to rumple, to pull about: Dan. *tæse*, to tease wool]: to separate or pull apart the fibres of; loosen by picking, as to *tease* oakum; to comb or card, as flax or wool; to raise and dress the nap of cloth; to reduce to shreds or fragments. TEAS'ING, imp. TEASED, pp. *tēzd*. TEASER, n. *tēz'ĕr*, one who teases; an instr. for carding, or for reducing to fragments. TEASEL, or TEAZEL, or TEAZLE, n. *tē'zl*, plant whose prickly heads or burs are employed to raise a nap on cloth (see below): V. to dress the surface of cloth with teasels. TEA'SELING, imp.: N. the cutting and gathering of teasels: raising a nap by means of the teasels. TEASELED, pp. *tē'zld*. TEASELER, n. *tēz'lĕr*, one who teasels.

TEASE, v. *tēz* [imitative of setting on a dog by hissing or snarling sounds: OF. *enticer*, to excite, to provoke: Sw. *tussa*, to set on]: to annoy or vex by petty requests, by jesting, or by impertinent importunities; to put into a heat of temper; to plague; to irritate. TEAS'ING, imp. TEASED,

pp. *tēzd.* TEAS'ER, n. *-ér*, one who teases; the stoker or fireman who attends to the furnace of a glass-work.—SYN. of 'tease': to annoy; molest; vex; disturb; harass; irritate; mortify; torment; plague; chagrin; tantalize; worry.

TEA'SEL: plant of genus *Dipsacus*, nat. order *Dipsacaceæ*. This order consists of herbaceous and half-shrubby exogenous plants, with opposite or whorled leaves, and flowers in heads or whorls, surrounded by a many-leaved involucre. About 150 species are known, natives of temperate parts of the old world. In the genus *Dipsacus*, the flowers are separated from each other by long, stiff, prickle-pointed bracts. The only valuable species of the order is the FULLER'S T., or CLOTHIER'S T. (*D. fullonum*), native of s. Europe, and supposed to be a cultivated variety of the wild *D. sylvestris*, from which it differs but little. The latter is naturalized in the United States, and the former escapes somewhat from cultivation. It is a biennial, several ft. high, with sessile serrated leaves, the stem and leaves prickly; and with cylindrical heads of pale or white flowers, between which are oblong, acuminated, rigid bracts, hooked at the point. The heads are cut off when the plant is in flower, and are used in woolen factories, and by fullers and stocking-makers, for raising the nap on cloth. No mechanical contrivance has yet been found to equal T. for this purpose; to which the hooked points, the rigidity, and the elasticity of the bracts are admirably adapted. The heads of T. are fixed on the circumference of a wheel or cylinder, which is made to revolve against the surface of the cloth. T. is cultivated in many parts of Europe. The seed is sown in March, on well-prepared strong rich land, and the plants thinned out to 12 inches apart. In Aug. of the second year the heads are ready to be cut. They are packed in bundles of 25 each, and about 160 such bundles are the usual product of an acre. The flowers of T. abound in honey, and the seeds are used for feeding poultry. The root was formerly in use as a diuretic and sudorific.

TEAT, n. *tēt* [O. Dut. *titte;* Ger. *zitze;* W. *teth;* Sp. *teta;* It. *tetta;* Gr. *titthos*, a breast: Icel. *totta*, to suck]: the nipple of the female breast; a pap; a dug. TEAT'ED, a. in *bot.*, having protuberances resembling the teats of animals.

TEAZEL and TEAZLE: other spellings of TEASEL (q.v.; see also TEASE 1).

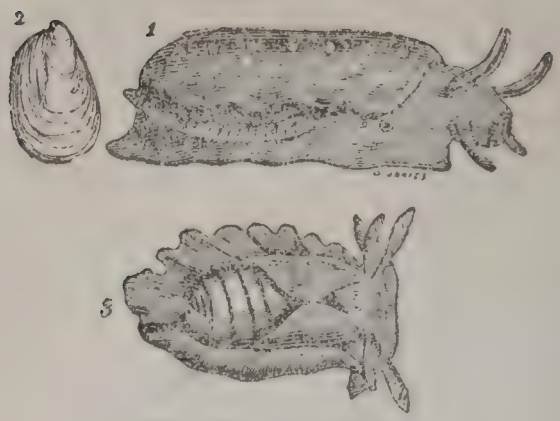
TEBBAD, n. *těb'bád* [Pers., fever wind]: a hot scorching wind that sweeps across the dry sandy plains of central Asia, bearing clouds of impalpable sand.

TECHE, BAYOU, *bī'ō tēsh:* formerly the lower part of the channel of Red river, extending from Bayou Courteau-bleu, e. of Opelousas, La., around Grand Lake basin, to the Gulf of Mexico: 175 m.; now including also the lower part of the Atchafalaya river, s. of Grand Lake. It is navigable for much of its course by small steamers. Below the head of navigation it is the richest sugar region in La., and one of the most noted in the world.

TECHILY, TECHINESS: see under TECHY.

PLATE 11.

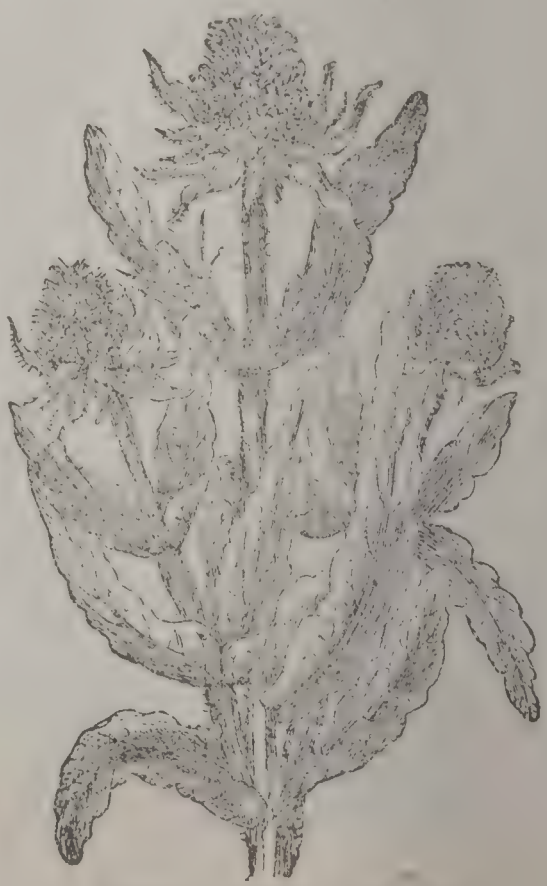
Teak
Tectibranchiata.



Tectibranchiata.

Common **Teal** (*Querquedula crecca*).

Indian Teak.



Fuller's Teasel (*Dipsacus fullonum*).

TECHNICAL, a. *tĕk'nĭ-kăl*, or TECH'NIC, a. *-nĭk* [Gr. *technĭkos*, artistic, relating to art—from Gr. *technē*, art, a trade: F. *technique*]: pertaining to the mechanical arts, or to a particular art, science, or employment; belonging or appropriate to a particular profession. TECH'NICALLY, ad. *-lĭ*. TECH'NICAL'ITY, n. *-kăl'ĭ-tĭ*, quality of being technical or peculiar to the arts; a technical word or expression: also TECH'NICALNESS, n. *-nĕs*. TECH'NIC, n. *-nĭk*, artistic skill. TECH'NICS, n. plu. *-nĭks*, such branches of learning as relate to the arts; the doctrine of arts in general.

TECH'NICAL EDUCATION: education in applied art and applied science, comprehending instruction in science and the principles of art. The branches of study pursued are elective or divided into courses, and include mathematics, physics, engineering (civil, mechanical, and mining), chemistry, geology, mineralogy, and other natural sciences. So far as requisite, general education and the German and French languages are added, to make the special branches more effective. The education may be for the general student or for the specialist. In the United States, military and naval academies took the lead to some extent. The Rensselaer Polytechnic Institute (q.v.) was established 1824, and the same year the Franklin Institute, Philadelphia—the latter confined to a library and courses of lectures. The Sheffield Scientific School (see YALE UNIVERSITY) was founded 1847, and the Lawrence Scientific School the same year (see HARVARD UNIVERSITY), followed by the Polytechnic Coll. of Penn. (Philadelphia) 1853, and others later. Technical education has departments in some colleges, and is included in Agricultural Education (q.v.), and enters to some extent into the more exclusively practical Trade Schools (q.v.) and the new movement for Manual Training (q.v.). In recent years private munificence in this direction has established the superb Pratt Institute (q.v.) in Brooklyn and the Drexel Institute in Philadelphia. See EDUCATION. See also Annual Reports of the U. S. Commissioner of Education.

T. E. has long received much attention in Europe, and various institutions for its promotion have been established—in Germany, France, and England especially, greatly advanced by governmental aid and control. The *Polytechnique* (q.v.) at Paris was founded 1794, and this with other advantages long gave the French pre-eminence in the arts particularly. The *Potytechnica* of Germany are without the special military feature of the above French institution. In England, industrial art received a great impulse from the London Exhibition of 1851. Local committees for T. E. were organized (by the governmental dept. of science and art) in places lacking or demanding instruction in science or art: these have established schools; and by means of prizes, payment on results to certified teachers of ordinary elementary schools, and scholarships, have efficiently subsidized instruction in science and art in the kingdom. The subjects of examination, more than 20, include the ordinary branches of science, also mining, metallurgy, navigation, nautical

astronomy, steam, agriculture, and physiography; and the examinations are conducted annually all over the country, the questions being framed by a staff of eminent scientific men; the main centre of the whole machinery being at South Kensington. Colleges also were subsidized by the Science and Art Department: Owens College, Manchester; Sir Josiah Mason's College, Birmingham; and Firth College, Sheffield. The Govt. School of Mines and Metropolitan School of Science applied to Mining and the Arts was organized anew 1881 under the title 'Normal School of Science and Royal School of Mines.' In 1878 a number of the city guilds of London associated to promote or organize, or, it might be said, initiate, more practical technological education—an association since joined by successively more of the city guilds, and latterly by the corporation. 1881, May, the foundation-stone of a great technical college, Finsbury College, was laid in Tabernacle Row, London. At Manchester, Preston, Dewsbury, Hawick, Sheffield, Leicester, etc., are schools to instruct artisans and others in the application of science and art to particular industries. The foundation of the great central institution at South Kensington was laid 1881. The plan includes laboratories on a complete scale, with work-shops, lecture-theatres, and class-rooms. It aims to supply a professional training to sons of manufacturers hitherto compelled to pursue their studies abroad, and to complete the training of artisans who have won distinction in branch or provincial colleges, and who, by scholarships from the Institute, or by the aid of their home colleges, of local societies, or of public-spirited individuals, are enabled to avail themselves of the finishing instruction in the Central Institution. Lastly, this college is intended to train a competent body of technical teachers, to diffuse through the land the highest theoretical and practical knowledge of the crafts and industries.

The elementary schools in Britain are subsidized on one hand to teach pure science and art under the guidance and aid of the science and art dept.; on the other hand, to teach scientifically, artistically, and practically, the useful arts, industries, and trades of the country, under superintendence of the City and Guilds of London Institute. The more promising pupils are by means of prizes and scholarships enabled to prosecute their studies at colleges in London and elsewhere, and to complete their technical education in the central institutions. Finally, the students receive diplomas of their attainments, diplomas which are accepted all over the land. Among the most successful of the older art institutions are the Watt Institution (School of Arts), established 1821 at Edinburgh, and Anderson's College at Glasgow.—The Journal of the Soc. of Arts, Reports of the Science and Art Dept., and Reports of Select Committee and the Royal Commission of 1880, contain much interesting information on this subject.

TECHNIQUE, n. *tĕk-nēk'* [F.]: in *art*, the method in which an artist uses his materials to express his conceptions.

TECHNOLOGY, n. *tĕk-nŏl'ŏ-jĭ* [Gr. *technē*, art; *logos*, discourse]; science or systematic knowledge of the industrial arts. In its widest sense it would embrace the whole field of industry, but it is generally restricted to the more important manufactures. T. is not an independent science, with a set of doctrines of its own, but consists of applications of principles established in various physical sciences (chemistry, mechanics, mineralogy, etc.) to manufacturing processes. See TECHNICAL EDUCATION. TECHNOLOGICAL, a. *tĕk'nō-lŏj'ĭ-kăl*, pert. to a description of the arts, or of the terms used in the arts. TECH'NOLOG'ICALLY, ad. *-lĭ*. TECHNOLOGIST, n. *tĕk-nŏl'ŏ-jĭst*, one who discourses or treats of the arts, or of the terms of art.

TECHNOL'OGY, MASSACHUSETTS INSTITUTE OF: school of science, theoretical and applied, in the city of Boston. It was chartered 1861, opened two years later, and is supported in part by an endowment of one-third of the proceeds for Massachusetts of the act of congress 1862, the remaining two-thirds having gone to the Mass. Agri. Coll. The degree bachelor of science is conferred on students completing one or more of the following four years' courses of study: 1, civil engin.; 2, mech. engin.; 3, mining and metallurgy; 4, architecture; 5, chemistry; 6, electrical engin.; 7, biology; 8, physics; 9, general course, science and lit.; 10, elective courses; 11, sanitary engin. There are special laboratories for women; a school of mechanic arts, including working in wood and iron; also advanced courses for degrees of master of science, doctor of science, and doctor of philosophy. Requirements for admission to regular courses are common Eng. studies, with algebra, geometry, and elements of French. Henry S. Pritchett, LL.D., is pres. In 1901-2 the professors and instructors numbered 139, students 1,430, volumes in the library 53,851; grounds and buildings were valued at $717,039, and productive funds $3,313,059. The institute has 2 bldgs. on Boylston st. and one in Trinity Pl. A new school site has (1903) been selected at Jamaica Plain.

TECHY, or TETCHY, a. *tĕch'ĭ* [a corruption of *touchy*]: touchy; peevish; irritable. TECH'ILY, or TETCH'ILY, ad. *-lĭ*. TECH'INESS, or TETCH'INESS, n. *-nĕs*, the state or quality of being techy.

TECK, *tĕk:* formerly a duchy in Swabia, named after a famous castle, of which ruins still exist; acquired by the House of Hapsburg in the 11th c.; and sold to the Duke of Würtemberg in the 14th c.; now source of the title of a ducal family connected by marriage with the royal family of England.

TECTIBRANCHIATE, n. *tĕk'tĭ-brăng'kĭ-āt* [L. *tectus*, covered; Gr. *brangchia*, gills]: one of an order of mollusks having the branchiæ or gills covered, or partly covered, by the mantle; one of the *Tectibranchiata;* ADJ. having covered gills. TECTIBRANCHIATA, order of gasteropodous mollusks, having the gills arranged only on one side, resembling pinnatifid leaves, and covered by the mantle and a small shell, sometimes hardly observable; in

other species conspicuous, as in the Bubble-shells (*Bulla*). The T. feed mostly on seaweeds, but some eat also animal substances. To this order belongs the Sea-hare of the Mediterranean (*Aplysia depilans*), sometimes 12 inches in length, and in former times an object of superstitious dread, on account of its grotesque form, and of a violet-colored fluid which it ejects from the inner surface of the mantle when molested, and which was supposed poisonous.

TECTONICS, n. plu. *tĕk-tŏn'ĭks* [L. *tectonĭcus;* Gr. *tektonĭkos*, of or belonging to building, architectural—from *tektōn*, a builder]: the art of construction; the art by which vessels, implements, and dwellings and other edifices, are formed agreeably to the end for which they are designed, and at the same time in conformity with artistic ideas. TECTON'IC, a. *-ĭk*, of or pert. to building or architecture.

TECTRICES, n. plu. *tĕk'trĭ-sēz* [L. *tectus*, covered—from *tegĕrĕ*, to cover]: the feathers which cover the quill-feathers and parts of the wing of a large bird.

TECUMSEH, *tē-kŭm'sĕh*, or TECUMTHA, *tē-kŭm'tha:* about 1770–1813, Oct. 5; b. near Springfield, O.; chief of the Shawnee Indians. He went on the war-trail early in life; led the Indians in the campaign with the Ky. militia about 1791; was in the battle of Mad river and the attack on Fort Recovery 1794; and joined his brother, Elskwatawa, the 'prophet,' in the attempt to organize all the Indians in the w. against the whites 1805. A large force of Indians, whom he had collected on the upper Wabash, was defeated by Gen. William Henry Harrison at Tippecanoe 1811, Nov. 7, while commanded by T.'s brother during his own absence among the Indians in the south. T. then took a band of Shawnees to Canada, became an ally of the British, who gave him the rank of brig.gen., and was joint-commander with General Proctor at the siege of Fort Meigs. He was in the battle of Lake Erie, and commanded the right wing of the British in the battle on the Thames. In the midst of this battle he stripped himself of his uniform, put on his hunting-costume, and was soon afterward shot dead.

TED, v. *tĕd* [Swiss, *zetten*, to separate into small parts: Bav. *zetten*, to strew: W. *tedu*, to stretch: Norw. *tedja*, to spread manure]: to turn or spread out (hay or new-mown grass). TED'DING, imp.: N. the act of shaking up or spreading, as in hay-making. TED'DED, pp.: ADJ. spread out to dry, as grass for hay. TED'DER, n. *-dĕr*, an implement for turning and spreading new-mown grass.

TEDDER, n. *tĕd'dĕr:* OE. for TETHER.

TEDE, n. *tēd* [L. *tæda*, a torch]: in *OE.*, a torch.

TE DEUM, n. *tē dē'ŭm* [L. *te*, thee, *Dĕum*, God]: ancient Christian hymn in Latin; named from its first words, '*Te Deum laudamus*'—'We praise Thee, O God;' sung on occasions of triumph and thanksgiving; also in the ordinary service (Rom. Cath. and Prot.) as an offering of high praise. It is at once one of the most simple and one of the most solemn and majestic of all Christian hymns—combining with its strains of noble praise a grand confession of the

common faith, and a humble supplication for pardon and grace. Its author and date are unknown: it is probably a compilation from a morning hymn of the early church dating from near the time of the apostles. It is traceable in a few of its materials to the middle of the 3d c. or earlier; and some have deemed its present form a compilation by Ambrose, Bp. of Milan, for the baptism of Augustine about 387; hence it is called sometimes the Ambrosian Hymn. Its echoes of Holy Scripture have for their key-note Is. vi. 3, with Rev. iv. 8, v. 13. It forms part of the daily 'Matins' of the Roman Breviary, and is recited at the end of 'Matins' on all festivals, and on all Sundays except those of Advent and Lent, to which, as being seasons of penance, the *Te Deum* is considered inappropriate.

TEDIOUS, a. *tē'dĭ-ŭs* [L. *tædĭum*, weariness, disgust—from *tædet*, it offends or wearies]: wearisome from slowness or prolixity; tiresome; irksome; dilatory. TE'DIOUSLY, ad. *-lĭ*. TE'DIOUSNESS, n. *-nĕs*, the quality of being tedious; tiresomeness; prolixity; length. TE'DIUM, n. *-ŭm*, irksomeness; wearisomeness; distaste from weariness, or from want of mental occupation; tiresomeness.—SYN. of 'tedious': irksome; troublesome; fatiguing; dilatory; tardy; sluggish; wearisome; tiresome; prolix; slow; wearying.

TEE, n. *tē:* the umbrella-like figure used as a finial on Buddhist topes; any pointed object; an umbrella in general, in the E. Indies.

TEE, n. *tē* [Icel. *tia*, to point out, to mark]: a mark set up in playing at quoits; the nodule from which the ball is struck in golf; in *curling*, the mark in the ice toward which the stones are hurled—also called the TOZEE. To TEE, as a ball, in *golf-playing*, is to raise it slightly on a projecting bit of earth or turf before giving it the stroke in the direction wished.

TEE, or T, *tē*, in DONE TO A TEE or T [alluding to the nice measurements of a T-square]: done exactly; done to a nicety.

TEEL'-SEED: see OILS: RAMTIL.

TEEM, v. *tēm* [AS. *teàm*, anything following in a row race, progeny: Low Ger. *toom*, progeny (see TEAM)]: to bring forth, as young; bring forth plentifully; to be fruitful or prolific; to be pregnant; to be full; to produce in abundance. TEEM'ING, imp.: ADJ. producing in abundance; fruitful; prolific. TEEMED, pp. *tēmd*.

TEEM, v. *tēm* [Scot. *toom*, empty, void: Dan. *tom;* Icel. *tómr*, empty: Gael. *taom*, to empty, to pour out]: in *OE.*, to pour out; to unload, as a cart. TEEM'ING, imp. TEEMED, pp. *tēmd*. See TOOM.

TEEN, n. *tēn* [AS. *teona*, injury]: in *OE.*, sorrow; trouble; mischief: V. to grieve; to excite; to provoke.

TEEN, v. *tēn*, or TEEND, v. *tēnd* [Dan. *tænde;* Sw. *tända*, to kindle]: in *prov. Eng.*, to light, as a candle. TEEN'ING, imp. TEENED, pp. *tēnd*.

TEENS, n. plu. *tēnz* [from *ten*]: years of one's age ending in *teen*—from thirteen to nineteen—as, a girl in her *teens*,

TEES, *tēz:* river in n. England, 90 m. long, flowing e, and forming the boundary between the counties of Durham (q.v.) and York (q.v.). It enters the North Sea ten m. below Stockton, to which town it is navigable for vessels of 60 tons.

TEETH, n. *tēth* [plu. of TOOTH (q.v.)]: small enamelled bones fixed in the lower and upper jaws, used for chewing, biting, cutting, or tearing (see below). TEETH, v. *tēth*, to breed or form teeth. TEETH'ING, imp.: N. the process of the first growth of teeth, called *dentition* (see DENTITION, PERIOD OF). TEETHED, pp. *tēthd.* IN SPITE OF HIS TEETH, contrary to his wishes and fixed resolution. TO THE TEETH, in opposition. TO CAST IN THE TEETH, to retort; to reproach. TO SHOW THE TEETH, to threaten.—*Teeth* are small enamelled bones fixed in the jaws of animals, fitted for chewing, biting, cutting, tearing, etc. A tooth is described by Prof. Owen, an authority on this subject, as 'a hard body attached to the mouth or commencement of the alimentary canal, partially exposed when developed. Calcified teeth are peculiar to the vertebrates, and may be defined as bodies primarily, if not permanently, distinct from the skeleton, consisting of a cellular and tubular basis of animal matter containing earthy particles, a fluid, and a vascular pulp.'—*The Anatomy of Vertebrates*, 1866, I. 359. The same writer says: 'In some species, they are modified to serve as formidable weapons of offense and defense; in others, as aids in locomotion, means of anchorage, instruments for uprooting or cutting down trees, or for transport and working of building materials. They are characteristic of age and sex; and in man they have secondary relations, subservient to beauty and to speech. Teeth are always intimately related to the food and habits of the animal, and are therefore highly interesting to the physiologist; they form, for the same reason, important guides to the naturalist in the classification of animals.'—*Circle of the Sciences; Organic Nature*, I. 264.

True teeth consist of one, two, or more tissues, differing in chemical composition and microscopical appearances. 'Dentine,' which forms the body of the tooth, and 'cement,' which forms its outer crust, are always present; the third tissue, 'enamel,' when present, being between the dentine and cement. The *dentine*, divided by Prof. Owen into hard or true dentine, vaso-dentine, and osteo-dentine, consists, according to his view, of an organized animal basis, disposed in the form of extremely minute tubes and cells, and of earthy particles; these earthy or calcareous particles being either blended with the animal matter of the interspaces and walls of the tubes and cells, or contained in a minutely divided state in their cavities. The tubes and cells contain, besides the calcareous particles, a colorless fluid, which is probably transuded blood plasma, or *liquor sanguinis*, and contributes to the nutrition of the dentine. In hard or true dentine, the *dentinal tubes* proceed from the hollow of the tooth known as the

pulp-cavity, in a slightly wavy course, nearly at right angles to the outer surface (see fig. 1). 'The hard substance of the tooth is thus arranged in hollow columns, perpendicular to the plane of pressure, and a certain elasticity results from these curves; they are upright where the grinding surface of the crown receives the appulse of the opposing tooth, and are horizontal where they have to resist the pressure of contiguous teeth. The tubuli, besides fulfilling the mechanical ends above stated, receive the plasma transuded from the remains of the vascular pulp, which circulates by anastomosing branches of the tubuli through the dentine, maintaining a sufficient though languid vitality of the system. The delicate nerve-branches on the pulp's surface, some minute production of which may penetrate the tubuli, convey sensations of impressions affecting the dentine—sensations whose acuteness is experienced when decay has affected the dentine, or when mechanical or chemical stimuli have "set the tooth on edge;" but true dentine has no canals large enough to admit capillary vessels with the red particles of blood.' When a part of the primitive vascular pulp from which the dentine is developed remains permanently uncalcified, red blood is carried by 'vascular canals' into the substance of the tissue. Such dentine is called *vaso-dentine*, and is often combined with true dentine in the same tooth, e.g., in the large incisors of certain rodents, the tusks of the elephant, and the molars of the extinct megatherium. Another modification of the dentine is when the cellular basis is arranged in concentric layers around the vascular canals, and contains 'radiated cells,' like those of bone: this is termed *osteo-dentine*, and resembles true bone very closely. The *cement* always corresponds in texture with the osseous tissue of the same animal, and wherever it occurs in sufficient thickness, as on the teeth of the horse or ox, it is traversed like bone by vascular canals. Moreover, when the osseous tissue contains minute radiated cells, precisely similar cells are likewise in the canal, and constitute its most marked characteristic. The relative densities of dentine and cement vary according to the amount of earthy matter,

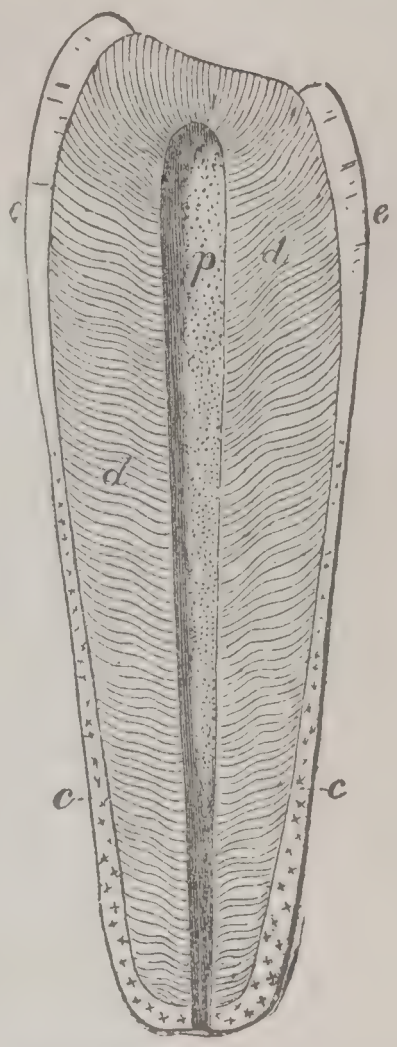


Fig. 1.—Section of Human Incisor Tooth, magnified: *c*, *c*, the cement; *d*, *d*, the dentine; *e*, *e*, the enamel, partly chipped off on the crown; *p*, the pulp-cavity.

In the complex grinders of the elephant and some other animals, the cement, which forms nearly half the mass of the tooth, wears down sooner than the dentine. The *enamel* is the hardest of all the animal tissues, and contains no less than 96·4 per cent. of earthy matter (mainly phosphate of lime), while dentine contains only 72 per cent., and cement and ordinary bone only 69 per cent., of earthy matter. The earthy matter is contained in comparatively wide canals, composed of animal membrane of extreme tenuity.

In tracing the teeth upward from their simplest to their

Fig. 2.—Magnified Section of a Molar Tooth of the Megatherium: *v*, vaso dentine; *d*, dentine; *c*, cement.

most complicated forms, we find a very few examples (solely among fishes, e.g., the wrasse) in which teeth consist of a single tissue—a very hard kind of non-vascular dentine. Teeth consisting of dentine and vaso dentine are very common in fishes, the hard dentine being external, and performing the office of enamel. Dentine and cement, the latter forming a thick outer layer, constitute the grinding teeth of the dugong. In the teeth of the sloth, the

hard dentine is reduced to a thin layer, and the chief bulk of the tooth consists of vaso-dentine internally and a thick crust of cement externally. 'The human teeth and those of the carnivorous mammals appear at first sight to be composed of dentine and enamel only; but their crowns are originally, and their fangs are always, covered by a thin coat of cement. There is also commonly a small central tract of osteo-dentine in old teeth. The teeth called compound or complex in *Mammalia* differ as regards their composition from the preceding only by the different proportion and disposition of the constituent tissues. Fig. 3 is a longitudinal section of the incisor of a horse; *d* is the dentine, *e* the enamel, and *c* the cement, a layer of which is reflected into the deep central depression of the crown; *s* indicates the colored mass of tartar and particles of food which fills up the cavity, forming the "mark" of the horse-dealer.'—*Organic Nature*, I. 267. Far more complex forms of teeth than this may be produced by peculiar arrangements, chiefly inflections, of the tissues. Certain fishes, and a family of gigantic extinct batrachians to which Owen has, from this remarkable peculiarity, given the name *Labyrinthodon* (q.v.), exhibit this kind of complexity in remarkable degree. Another kind of complication is produced by an aggregation of many simple teeth into a single mass. These compound teeth are most frequent in fishes, but are occasionally found in mammals. In the elephant, the compound molars belong to this class, the denticles being in the form of plates vertical to the grinding surface, and transverse to the long diameter of the tooth. When the tooth is bisected vertically and longitudinally, the three substances, dentine, *d*, cement, *c*, and enamel, *e*, are blended (see fig. 4).

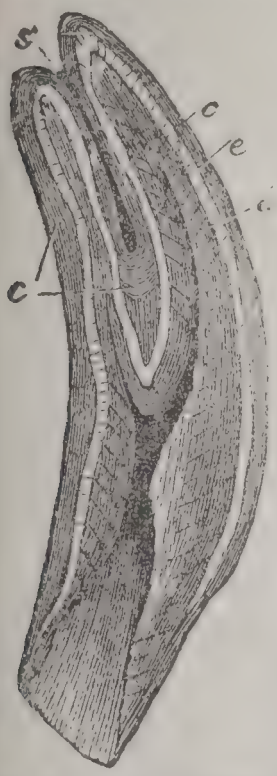


Fig. 3.—Longitudinal Section of the Incisor of a Horse.

In *fishes*, the teeth, as regards number, form, substance, structure, situation, or mode of attachment, offer a greater and more striking series of varieties than those of any other class of animals. In all fishes, the teeth are shed and renewed, not once only, as in mammals, but frequently during their whole lives; and, as Prof. Owen observes, 'this endless succession and decadence of the teeth, together with the vast numbers in which they often co-exist in the same fish, illustrate the law of vegetation or irrelative repetition as it manifests itself on the first introduction of new organs in the animal kingdom.' While comparatively few fishes are entirely devoid of teeth, we find, in the class of *Reptiles*, that the whole order of *Chelonia* (tortoises and turtles), the family of toads (*Bufonidæ* in the order *Batrachia*), and certain extinct genera of *Sauria* (lizards), are toothless. Frogs have teeth in the upper, but not in the

lower, jaw. Newts and salamanders have teeth in both jaws and on the palate; and teeth are found on the palate as well as on the jaws of most serpents. In most lizards, and in crocodiles, the teeth are confined to the jaws. The teeth in reptiles are mostly simple, of conical form, and adapted, as in most fishes, for seizing and holding, but not for dividing or masticating, the food. In no reptile does the base of the tooth branch into fangs; and, as a general

Fig. 4.—Longitudinal Section of Part of an Elephant's Grinder:

c, the cement; *d*, the dentine; *e*, the enamel; *p*, the common pulp-cavity; *r*, one of the roots of this complex tooth.

rule, the base of the tooth is anchylosed to the bone which supports it. The completion of a tooth is soon followed by preparation for its removal and succession, the faculty of developing new tooth-germs seeming unlimited in this class. For further details regarding the teeth of fishes and reptiles, see Prof. Owen's *Anatomy of the Vertebrates*, 1866, I 359–409.—Birds have no teeth.

Mammals include a few genera and species devoid of teeth. The true Ant-eaters (*Myrmecophaga*), the Pangolins or Scaly Ant-eaters (*Manis*), and the Spiny Monotrematous Ant-eater (*Echidna*), are strictly toothless. The Ornithorhynchus has horny teeth, and the Whales (*Balæna* and *Balænoptera*) have transitory teeth, succeeded in the upper jaw by whalebone. The female Narwhal exhibits nothing more than the germs of two teeth in the substance of the upper jaw; in the male, one of these germs becomes developed into the remarkable weapon which specially characterizes the animal, and to which it

generic term, *Monodon* (single tooth), is due. In the Great Bottle-nose Whale, in the adult state, there are only two teeth (in the lower jaw); whence the name *Hyperoödon bidens*. The Elephant has never more than one entire molar, or parts of two, in use on each side of the upper and lower jaws; to which are added two tusks, which are modified incisors, more or less developed, in the upper jaw. Some rodents have 2 grinders on each side of both jaws, which, added to the 4 cutting-teeth in front, make 12 in all; but the usual number of teeth in this order is 20, though Hares and Rabbits have 28 each. The number of teeth, 32, which characterizes man, the apes of the old world, and the true ruminants, is the average one in the class Mammalia; but, according to Prof. Owen, 'the typical number is 44.' 'I have been led,' he observes, 'chiefly by the state of the dentition in most of the early forms of both carnivorous and herbivorous mammalia which flourished during the eocene tertiary periods, to regard 3 incisors, 1 canine, and 7 succeeding teeth, on each side of both jaws, as the type-formula of diphyodont dentition.' Prof. Owen divides the class Mammalia, in regard to the times of formation and the succession of their teeth, into the *Monophyodonts* (Gr. *mŏno-*, once; *phy-*, generate; and *odont*, tooth), or those that generate a single set of teeth, e.g., the sperm whales, dolphins, porpoises, armadillos, and sloths; and the *Diphyodonts* (from *di*, twice, etc.), or those that generate two sets of teeth, as the Mammals generally, with the above exceptions. A few of the Monophyodonts have 80 to 100 teeth. See MAMMALIA. The hog, the mole, the gymnure, and the opossum, are among the few existing quadrupeds which retain the typical number and kinds of teeth. For the formula expressing the number of the different kinds of teeth—viz., the incisors or cutting-teeth, the canines or dog-teeth, the premolars, and the molars or true grinders—commonly known as the *dental formula*, see DENTITION, in which article the *milk* or *deciduous* teeth, and the order in which they appear, also are described. It is only in the Mammals that we have a well-marked division of the teeth into the four kinds—incisors, canines, premolars, and molars. Each is now to be briefly described.

The *incisors*, or cutting-teeth, are in front, and have a single conical root or fang, and a vertical crown bevelled behind, so as to terminate in a sharp cutting edge. These teeth are specially fitted for cutting the food. In man, there are two of these incisors in each side of each jaw. In herbivorous animals, they crop the herbage; in rodents (rabbit, hare, rat, beaver, etc.), these teeth are very much developed, and differ from any other teeth in Mammals in this respect, that their growth continues through life; and if their length does not constantly increase, it is because their free extremity or edge is worn down by trituration as fast as they grow at the base from their roots.

The *canines* (so called from their prominence in the dog) are next to the incisors. Their crown is rather conical than wedge-shaped, and their fang sinks more deeply into

the jaw than that of the incisors. In all carnivorous animals, they are largely developed, being formed obviously for tearing the flesh of their prey. In man, there is one canine tooth in each half-jaw; and there is never more than this number in any of the lower animals.

The *premolars* (known also as bicuspids and false molars) are next in order to the canines; they are smaller than the latter, and their crown presents two pyramidal eminences. In man, there are two premolars in each half-jaw. Their function approaches more nearly that of the true molars behind them, than that of the canines.

The *true molars* (or multicuspids) are placed most posteriorly. They are remarkable for comparatively great size, for the square form of the upper surface on which are

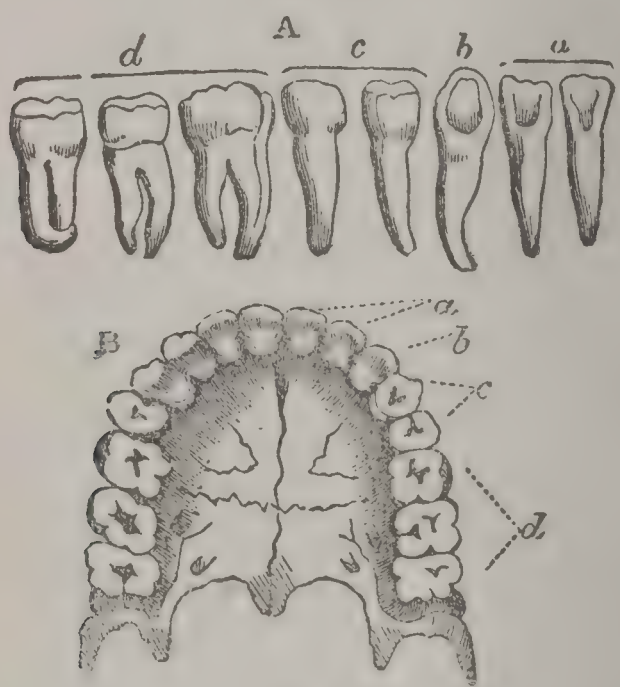


Fig. 5.

A, the separate human teeth as they occur in the half-jaw of the adult; B, the human teeth *in situ* in the upper jaw; *a*, *a*, incisors; *b*, *b*, canine; *c*, *c*, premolars; *d*, *d*, true molars.

from three to five elevations or cusps, and for their short root divided into two to five branches, each perforated at its extremity. In man, there are three molars in each half-jaw, the posterior one being termed the wisdom-tooth, from its being cut the latest: they are employed especially for grinding the food, under the action of the muscles of the lower jaw.

The teeth are so admirably adapted for the special purposes which they are to fulfil that it is generally easy, from careful examination, to say to what class of animal they belong, and to draw various conclusions regarding the habits and structure of the class generally. Thus, in carnivorous animals, the molars are not grinding-teeth, but present sharp cutting edges, and those of the upper and lower jaw overlap each other; resembling a pair of

scissors in their action. In insectivorous animals, the molars have a tuberculated surface, with conical points and depressions, so arranged as to lock into each other. In frugivorous animals, living on soft fruits, these teeth are provided with rounded tubercles, while in herbivorous animals, they have a broad, rough surface, resembling a millstone.

There is also a close connection between the articulation or joint of the lower jaw and the nature of the food used by the animal. Thus, in purely carnivorous animals, in which the teeth simply tear and cut the food, no grinding motion is required, and the jaw is capable only of a simple hinge-motion in the vertical plane; while in herbivorous animals the joint is so constructed as to allow of extensive sliding and lateral motion of the lower molar teeth upon the upper. In man, both the form of this articulation and the general character of the teeth point to an intermediate position in relation to food, and form a good physiological argument for the mixed diet which general custom has decided to be most favorable and natural to our species.—See further the three works of Prof. Owen quoted in this article, and his *Odontography* (1844), and his article 'Teeth' in *The Cyclopædia of Anatomy and Physiology;* F. Cuvier, *Sur les Dents*, etc.; and De Blainville's *Osteographie.*

Diseases of the Teeth.—For the dangers to which infants and children are exposed in the process of teething, see Dentition. The following remarks concern the most important affections of the permanent teeth.

1. *Caries of the teeth* usually begins in the dentine immediately below the enamel, a yellow or brown spot being observed on the surface of the tooth over the affected part. The tissue soon becomes softened, and a small cavity is formed, which, after a time, presents an external opening, in consequence of the unsupported enamel giving way. The substance of the tooth now decays more rapidly, and the caries gradually approaches the central or pulp-cavity, which at length is opened. Hitherto there has been little or no suffering, but now pain is experienced under the action of irritant substances, heat, cold, etc. Inflammation, proceeding to suppuration, takes place; the pulp is gradually destroyed by ulceration; and the body of the tooth, thus deprived of nourishment, decays, and leaves nothing but the outer coating of enamel, which then breaks away by degrees, till nothing but the fangs of the tooth remain, and these usually cease to give pain. Caries is not only a common cause of toothache, but also frequently gives rise to obstinate headache, pain in the ear, deafness, squinting, impossibility of bearing the light (photophobia), and other anomalous symptoms, which immediately disappear on removal of the diseased tooth. In these cases, the tooth may never have ached, but will be found painful when pressed up or smartly struck. The primary cause of caries is constitutional, and it occurs especially in scrofulous and ill-nourished persons, or in those whose health is broken down by too frequent preg-

nancies, prolonged lactation, abuse of mercury, etc. The direct or exciting causes are usually described as: (1) such as destroy the integrity of the enamel, and thereby expose the dentine to the influence of irritant substances; or (2) such as operate on the vital susceptibilities of the dental tissues. Among the former are acids and other corrosive substances taken into the mouth, sour eructations, attrition of opposing surfaces of the teeth, and all kinds of mechanical violence; while among the latter are hot and cold drinks, especially in quick alternation. The excessive use of sugar also is commonly regarded as a cause. Many of the best dentists, however, deny that acids (taken medicinally) or that the abrasion of the enamel can give rise to caries.

As to treatment: if the caries be slight and recent, the decayed portion must be removed, and the cavity filled with gold (see DENTISTRY). 'But, if the decay has advanced far toward the pulp-cavity, or has laid that open, it may be necessary first to employ aperients and tonics, and use some application to deaden the sensibility of the tooth, so as to enable it to bear the stopping, and to protect it meanwhile from contact with food and saliva.' Many a useless visit to the dentist might be avoided if the patient would take an aperient dose, e.g., Epsom salts two or three consecutive mornings; and after cleansing out the cavity with dry cotton-wool would insert twice a day a plug of that substance, moistened in Eau-de-Cologne, or, still better, in either of the following solutions: (1) mastic solution, formed by dissolving a dram of mastic in an ounce and a half of Eau-de-Cologne; or (2) ethereal tincture of tannin, formed by dissolving a dram each of tannin and mastic in an ounce and a half of sulphuric ether. Often by these means a painful tooth may be brought into a state in which it will bear stopping. The patient's sensations will warn him against drinking very hot or cold, or sweet or acid, fluids, and against exposure to cold draughts of air. Whenever the teeth show tendency to rapid decay, general tonic treatment is indicated.

2. *Necrosis* is characterized by blackness of the tooth and looseness in its socket: it may be caused by violence, accompanied with destruction of the nutrient vessels, or by inflammation of the pulp. If the tooth gives trouble, it must be extracted. Necrosis of the teeth is distinct from the very destructive necrosis of the dental alveolar processes and of the jaws generally, which results from the poisonous action of phosphorus fumes, or from the very similar affection which sometimes follows the eruptive fevers. For an account of the singular and terrible disease from which artisans employed in making lucifer-matches suffer, from inhaling the fumes of phosphorus (probably in the form of phosphorous acid), see PHOSPHORUS: also a review of Von Bibra and Geist's exhaustive treatise (German) on the subject in the *British and Foreign Medico-chirurgical Review*, 1848, April. The necrosis and exfoliation of the alveolar processes and portions of the jaws in children, consequent on the eruptive fevers, are accom-

panied by shedding of the teeth, and are considered essentially the same as the necrosis in phosphorus-poisoning, and, like it, the result of local application of a specific poison, generated within the individual, to the vascular parts of the teeth.

3. *Alveolar abscess* is a suppuration around the fang or fangs of a tooth, usually carious, accompanied by absorption of the bony walls of the alveolar process, and enlargement of the little sac of pus or matter, which gradually makes its way to the surface, 'either along a canal by the side of the fang of the tooth opening at the edge of the gum, or through the gum itself at a point corresponding to the end of the root (or roots) of the tooth implicated. When, however, the fangs are unusually long, or the reflection of the mucous membrane from the gum to the cheek or lip is very superficial, this same discharge may burrow still more outwardly, and find its exit on the surface of the face.' When the discharge bursts, as it usually does, through the gum, the alveolar abscess is reduced to its simplest form, and is known as a *gum-boil*. When the discharge takes place in the region of the cheek or chin, the true nature of the case may easily be mistaken by a careless surgeon, who might refer the symptoms to bone-disease. The cause of this affection is either caries or necrosis. In its earliest stage, the disease may be cut short by extraction of the affected tooth, or even by the removal of the stopping, if the tooth is a stopped tooth. If it is desirable to save (for appearance or otherwise) a threatened tooth, the gum should be freely leeched, and hot fomentations applied to the swollen part of the face, and the system should be briskly purged. As soon as matter can be detected, it should be allowed to escape by a puncture through the gum—an operation followed by immediate relief, and by rapid subsidence of the swelling, though pus continues to be discharged for a considerable time. Indeed, the disease seldom ceases altogether till the offending tooth is removed. When the abscess shows symptoms of pointing on the face, the tooth must at once be extracted, and more serious surgical interference will probably be necessary.

4. *Toothache* is not so much of a disease as a symptom of various morbid states of the affected part. 'Toothache,' says an authority, 'offers every possible variety in degree, character, and duration. The pain runs through all the grades which intervene between a slight sensation of uneasiness and unsupportable agony. It may be dull, aching, heavy, sharp, pungent, throbbing, grinding, or lancinating. It may be continued or paroxysmal, remittent or intermittent, and regular or irregular in its recurrence. It may come in flashes, and as suddenly disappear; or may continue a long time with little variation.' According to the various conditions which give rise to it, toothache may be divided into: (*a.*) *Inflammatory toothache*, which is almost always dependent on caries. The inflammation may be seated in the pulp of the tooth, in the nerve-twig entering the pulp-cavity, or in the periosteum investing its roots, and reflected over the interior of the alveolar cavity. There

is generally some external swelling after the pain has continued some time, and it occasionally extends to the salivary glands. The tooth is at the same time very tender, and any force applied to it aggravates the pain, which is increased also by hot and cold liquids taken into the mouth. When, as in the great majority of these cases, the pain is associated with caries, the best treatment, according to an authority on this subject, is as follows: Let the patient have a strongly purgative dose; confine him to spoon-diet; let him wash out the mouth with a solution of carbonate of soda in tepid water; let the gum around the tooth, and between it and its neighbors, if tumid and tender, be deeply scarified with a fine lancet; then let the cavity be filled loosely with a little cotton-wool, dipped into the solution of tannin and mastic (see the formula above); this will usually cure if the toothache be curable. If the pain is very violent, half a grain of powdered acetate of morphia may be taken up with the cotton imbued with the tannin, which should be warmed before it is put into the cavity. As soon as the pain is relieved, the tooth, if of use, should be stopped with gold or amalgam; if of no use, it should be extracted. Most of the violent, burning, empirical nostrums, e.g., creosote, oil of thyme, etc., though they may be of service when introduced in small quantity by a skilful hand into the carious tooth at the right time, can do nothing but mischief when used indiscriminately. (*b.*) *Neuralgic toothache* may occur either in sound or in carious teeth: it may be recognized by its occurrence in paroxysms at more or less regular intervals, and by its being attended with little or no swelling of the external parts. It is very common in earlier months of pregnancy, and in persons of general neuralgic tendency, and is often excited by changes in the weather. The treatment is the same as for neuralgia generally. After the bowels have been freely opened, chalybeates and quinine must be given in large doses, and frictions with proper tinctures (which a medical man may prescribe) may be carefully applied to the gum. (*c.*) *Rheumatic and gouty toothache* may occur in sound or carious teeth in rheumatic or gouty persons. The constitutional treatment applicable to these diseases must be tried, with the local applications above noticed.

5. *Falling of the teeth*, due to absorption of the socket, may be regarded as almost an ordinary consequence of old age; but it frequently occurs under the popular name *scurvy of the gums* in middle age, though very seldom before the 30th year. True scurvy, gangrene of the mouth, or mercurial inflammation of the gums, may cause the loosening of the teeth at any age; but there are two other conditions which lead to the same result. In one of these affections the gums swell, and assume a deep red color, and the inflammation appears to be propagated into the alveoli, producing a thickening of the periosteum, and a consequent elevation of the tooth above its ordinary level. By frequently recurring attacks of this inflammation, the tooth is lifted out of its socket, while the gum retreats from the neck, and leaves a portion of the roots exposed.

The tooth thus deprived of its support at length falls, after which the gum heals, and the patient is relieved. The remedies indicated are those tending to relieve inflammation of the gum, but they are seldom successful. In the other affection, there is conjoined suppuration of the gums and sockets, and the disease shows itself first by an oozing of pus from behind the edges of the gums when they are pressed. From the absorption of the sockets, and the simultaneous retreat of the gums, the teeth, as in the previous case, at length fall out, if they have not, for the patient's comfort, been previously extracted. Little can be done in treatment.

6. *Painful and difficult eruption (cutting) of the wisdom-teeth* may be protracted for months or years unless surgical aid is called in. The difficulties 'arise from the position occupied by these teeth, so close to the joint of the lower jaw, where the mucous membrane is reflected from the gums to the cheek and fauces, combined with the very common condition, that the jaw is not sufficiently elongated backward to allow the *dentes sapientiæ* to range in the horizontal series with the other teeth.' This mechanical difficulty not only holds back these teeth in their bony bed, but it often prevents their proper direction of growth. As a consequence of these displacements in the upper jaw, it often happens that when the jaws are brought together, a bit of mucous membrane is nipped and pinched, leading first to ulceration and extreme tenderness, subsequently to cicatrization and stiffness of the parts. From insufficient room in the lower jaw, the crown only partially emerges through the gum, the first cusp coming through it, while the hinder cusps remain covered. This produces a distressing pinching of the mucous membrane over the tooth every time the jaws are brought in contact. Another troublesome symptom, often associated with the painful cutting of a lower wisdom-tooth, is spasmodic but continuous contraction of the masseter muscle, so as to keep the jaws nearly closed, and capable of only slight separation. The most distressing result, however, is the suppuration that often attends the difficult eruption of the tooth. Even in ordinary cases, when none of these complications are present, there may be much diffuse and erratic pain. The treatment must be left to the surgeon-dentist.

7. *Hemorrhage after extraction of teeth* has occasionally proved fatal, and is not very rare as a troublesome and even dangerous complication of the operation. In most of the recorded cases there has been distinct evidence of the existence of the hemorrhagic diathesis, or, in other words, of a liability to bleeding profusely from the most trivial wounds. No better local treatment can be recommended than that suggested by John Hunter in the 18th c.: 'In general, it will be sufficient to stuff the socket with lint, or lint dipped in oil of turpentine, and to apply a compress of lint or a piece of cork thicker than the bodies of the adjacent teeth, so that the teeth in the opposite jaw may keep up a pressure.' Matico and saturated alcoholic

solution of tannin may be equally efficacious as styptics, but are not superior to oil of turpentine. In some cases the extracted tooth has been successfully replaced as a plug. Internal administration of astringents, e.g., tannin and oil of turpentine, should, under medical prescription, be combined with the local treatment.

8. For *Tartar* of the teeth, see that title.

TEETOTALISM, n. *tē-tō'tăl-ĭzm* [for origin, see below, also compare TEETOTUM]: entire abstinence from the drinking of intoxicating (distilled or fermented) liquors. The origin of the word is perhaps threefold. The Rev. Joel Jewell asserts that it originated in the United States (in Hector, Schuyler co., N. Y.) about 1827, when his 'new pledge' of total abstinence began to be substituted for the 'old pledge' of abstinence from spirits, with toleration of wine, beer, cider. On the lists of the persons bound by pledge of abstinence, Joel Jewell, as sec. of the first of such societies in N. Y., began to put the letters O. P. after the names of those bound by the old pledge, and the letter T. after those of persons pledged to total abstinence. From the repeated explanation T. total (i.e., T = total) came the expression T-total, afterward written teetotal.—In England the word came into existence in Lancashire about 1833, through the stammering habit of a zealous advocate of the reform, Richard Turner, artisan of Preston. Quite independently also the word appears to have come into being in Cork, Ireland, through the stammering of one of Father Mathew's early supporters: see TOTAL ABSTINENCE: TEMPERANCE MOVEMENT. TEETO'TAL, a. *-tăl*, pertaining to or practicing teetotalism. TEETO'TALER, n. *-ĕr*, or TEETO'TALLER, n. *-lĕr*, one pledged to abstain from all use of intoxicating liquors. TEETO'TALLY, ad. *-lĭ*, in *slang*, wholly; entirely.

TEETOTUM, n. *tē-tō'tŭm* [see note below]: a four-sided toy, somewhat like a top, but twirled by the fingers; any small thing in contempt. *Note.*—This ancient toy for playing games of chance has four sides, which exhibit respectively the letters A., D., N., T. The stake was awarded according to the letter that turned up after it ceased spinning: A. [L. *aufer*, take away] indicated to the successful player his authority to *take away* one from the stakes; D. [L. *depōnĕ*, lay or put down] indicated a forfeiture of a stake; N. [L. *nihil*, or *nihilum*, nothing] indicated nothing gained or lost (this is traditionally handed down among boys in play, as when they shout out in a game of marbles, to one who has gained nothing, 'Nichol, nothing'); T. [L. *totum*, the whole] indicated a title to the whole stakes. From this last [*word* and *letter*, viz., T. *totum*], the toy is named.

TEFF: see MEADOW GRASS.

TEFSA, *tĕf'sâ*, or TADLA, *tâd'lâ*, or TEDLA, *tĕd'lâ*: town in Morocco, 135 m. n.e. of the city of Morocco; in the fertile, well-peopled district of Tadla, on the banks of the Um-er-Beg. It is one of the oldest towns of the country, and its manufactures of woolen cloths and shawls are important.—Pop. (with the small town or suburb Efza) 10,500, of whom 2,000 are Jews.

TEG, or TEGG, n. *tĕg*: a young sheep; a doe in its second year.

TEGMEN, n. *tĕg'mĕn* [L. *tegmen* and *tegmen'tum*, a covering—from *tegĕrĕ*, to cover]: in *bot.*, the second covering of the seed. TEGMENTUM, n. *tĕg-mĕn'tŭm*, in *anat.*, the upper part of the main body of the peduncular fibres of the cerebrum. TEGMEN'TA, n. plu. *-tà*, in *bot.*, the scaly coats which cover leaf-buds.

TEGNÉR, *tĕg-när'*, ESAJAS: Swedish poet, most eminent of Swedish writers: 1782, Nov. 13—1846, Nov. 2; b. Kyrkerud, in the province of Wermland. He was educated at the Univ. of Lund, where he took the degree M.A. 1802. In 1805 he was appointed sub-librarian to the univ., and lecturer on æsthetics. In 1811 the Acad. prize was awarded to his poem of *Svea*, or Sweden, which at once raised him to the rank of one of the most popular writers of his country. He had previously written several spirited war-songs and national odes, which had attracted favorable notice. In 1812 he became prof. of Greek, and at the same time (though, it is said, he did not take holy orders) was given the pastoral care of the parish of Stäfje. During the next 10 or 12 years he devoted himself to his clerical duties and to theological learning with an earnestness remarkable in one who had seemed to lack the religious temperament. During this period he composed his two famous religious idyls *Prestvigelsen*, or the 'Consecration of a Priest,' and *Nattvardsbarnen*, or 'The Young Communicants;' and wrote *Axel*, poetic romance regarded by some Swedish critics as even superior to his *Frithiof's Saga*. Of the latter work, the first cantos appeared in a literary journal, the *Iduna*, edited by the historian Gejer, and conducted under the auspices of the Gothic Soc., whose leading object was to foster national literature and put down the prevalent taste for the pedantic classical or foreign style. In 1825 T. published the closing parts of *Frithiof's Saga*, which follows rather too closely the ancient saga. But notwithstanding the inharmonious character of the work—a collection of many ballads and odes in various meters, rather than a complete epic—the *Frithiof's Saga* became the most popular poem of Sweden: indeed, before its completion it had gained a European fame; and its translation into German was urged by Goethe. Though its accuracy in the details of early Scandinavian life is open to criticism, it gives the freshest presentation of the life in an imaginative form. The clergy of the diocese of Wexio evinced their admiration by nominating him for the vacant bishopric, to which the king at once appointed him, 1825. In his place at the diet, he was a conspicuous supporter of ultra-conservative

views, in opposition to the extreme liberal doctrines which formerly he had advocated. His speeches in the chamber and on various public occasions have great reputation in Sweden and Norway: they deal with questions of education, literature, and finance. In 1839 T. was proposed for the archbishopric of Upsala; but in the next year he showed symptoms of insanity, which had afflicted other members of his family. After a few months' confinement in an asylum, he returned to his work; but he had an apoplectic stroke 1843, and, after lingering many months in a paralytic condition, he died. About 1825 he had had an unreasonable and unfortunate love affair.—His collective works, edited by his son-in-law, Prof. Böttiger, were pub., 6 vols. (Stock. 1848). All his larger and more popular poems have been translated into German, French, and English; Eng. translations of *Frithiof* are said to number 19, German 18; and there has been at least one in every European language. Longfellow's transl. is well known; also R. G. Latham's (1838), G. Stephens' (1841).

TEGUCIGALPA, *tā-gō-sē-gäl'pä:* cap. of Honduras, Central America; on a table-land 3,426 ft. above sea-level, 25 m. s.e. of Comayagua. T. is the largest and finest city in the republic. Near it are gold, silver, and copper mines. —Pop. 12,000.

TEGULAR, a. *tĕg'ū-lĕr*, or TEG'ULATED, a. *-lā-tĕd* [L. *tegŭla*, a roof-tile—from *tego*, I cover]: pertaining to or resembling a tile; consisting of tiles or disposed as tiles, overlapping.

TEGUMENT, n. *tĕg'ū-mĕnt* [L. *tegumen'tum*, a covering —from *tego*, I cover]: in *anat.*, the general covering of the human body; any natural covering or envelope. TEG'UMENT'ARY, a. *-mĕnt'ĕr-ĭ*, pertaining to or consisting of coverings.

TEHEE, int. or n. *tē-hē'* [an imitative word]: a sound made in laughing; a titter: V. to laugh. TEHEE'ING, imp. TEHEED', pp. *-hēd'*.

TEHRAN, *tĕh-rän'*, frequently spelled TEHERAN, *tĕh-hĕr-än':* city, cap. of Persia and of the province of Irak-Ajemi; 70 m. s. of the shore of the Caspian Sea. It is on a wide plain dotted with mud-built villages, and pierced with many circular pits which reach down to the great subterranean water-courses, on which, in this region, the life of animal and plant is dependent. On the n.e. runs the lofty range of the Elburz Mountains, rising in the noble and graceful Demavend 22,000 ft. above sea-level, and giving dignity to an otherwise tame and unattractive scene. The town consists almost entirely of mud-houses, packed within a mud-wall 20 ft. high, and 4 m. in circumference. The principal buildings are the British and Russian residencies; the bazaar of Taki Khan (finished 1851, cost $150,000). The Ark, or Citadel—in the suburbs—is the shah's palace, and about 2½ m. n. of it is the Castle of the Kajars (Kasr-i-Kajar), the 'Windsor Palace' of the Persian rulers. The streets mostly are narrow, and miserably paved. Carpets are manufactured; but the chief

trades are shoemaking and manufacture of hats and linen goods. Several telegraph lines centre here. In the King's College are about 250 students, with some European professors.—In the vicinity of T. are the ruins of Rei, the *Rhages* of Scripture, known in the time of Alexander the Great under the name *Ragæ*, and the birthplace of Harûn-al-Raschid.—Pop. of T. estimated (1902) 250,000; in summer (when those who are able to do so move out to the mountain slope) it is less.—See S. G. W. Benjamin's *Story of the Persians* (Boston 1886); *History of Persia*, by Clements R. Markham (1874).

TEHUANTEPEC, *tā-wân-tā-pĕk'*: river-port of s. Mexico, in the territory of T., 10 m. above the mouth of the river T., in the bay also of T. The inhabitants are engaged in manufacturing salt and cotton fabrics, and in indigo-planting. Pearl-fishing is carried on, and a purple dye is procured from a shell-fish which abounds in the vicinity. —Pop. 15,000.

TEHUANTEPEC, *tā-wân-tā-pĕk'*, ISTHMUS OF: narrowest part of Mexico; between Campeche and Tehuantepec bays; comprising the states of Tobasco and Chiapas and parts of Vera Cruz and Oajaca; minimum breadth, bay to bay, 130 m. Its drainage is by the Coatzacoalcos river, which empties into Campeche Bay, and by the Tehuantepec river, which flows into the bay of the same name. It has three natural divisions—the Atlantic plains, the mountainous or central district, and the Pacific plains; and derives its chief importance from its availability as an interoceanic route. With the view of constructing a ship canal across the isthmus, it has been surveyed many times; once (1814) the Spanish govt. authorized the opening of a canal there; and later the U. S. govt. (1870–1) had the isthmus surveyed as part of the plan for thoroughly exploring the whole American isthmus. In 1879 a company was organized in Boston, under a Mexican grant, to construct an interoceanic railroad there, and work was carried on for two years, when the grant was revoked, and the Mexican govt. undertook a similar scheme. Meanwhile (1880) a concession was granted to Capt. Eads to construct a ship railway, an ordinary railway, and a telegraph line across the isthmus; but he died before the work was fairly started. French engineers preferred the Panama route, and U. S. engineers and naval officers the Nicaragua route, for a ship canal. The former was prosecuted for several years at great expense and abandoned; and work on the latter route, also, was carried on by an influential U. S. corporation and then suspended. See EADS, JAMES BUCHANAN: LESSEPS, FERDINAND DE: INTEROCEANIC SHIP CANAL: INTEROCEANIC SHIP RAILWAY.

TEI'DÆ: see MONITOR.

TE IGITUR, *tē ij'i-tĕr* [L., Thee therefore]: one of the service-books of the Rom. Cath. Church, an extract from the Roman missal, containing the canon of the mass and some other portions of the Liturgy which do not vary

with the festivals or the ecclesiastical seasons. It is named from the first words of the canon. This service-book, as distinct from the missal, is used by prelates and other dignitaries; and as the 'canon' is the most sacred part of the service, oaths upon the T. I. have been regarded as especially solemn.

TEIGNMOUTH, *tin'mŭth:* English seaport, market-town, and favorite watering-place on the s. coast of Devonshire, on the n. side of the estuary of the Teign. In front, on the sea-side, is the wide esplanade known as the *Den*, formed of a huge bank of sand, accumulated in the course of ages at the river's mouth—one of the chief features of the place. The harbor is safe and commodious, though difficult of entrance, the channel of the river being obstructed by a shifting bar of sand. The chief imports are coal and culm; the exports, granite from Dartmoor, and china-clay. There is a sea and river fishery. T. is connected with Shaldon, on the other side of the river, by a wooden bridge of 34 spans, 1,671 ft. in length, with a swing over the main channel for passage of ships. There is a large convent and educational establishment. The town is of very ancient origin. The climate is mild and salubrious, and the country beautiful. T. is a station on the South Devon railway.—Pop. (1881) 7,120; (1891) 8,292.

TEIL, n. *tēl* [OF. *teil*, the bark of the lime-tree—from L. *tilia*, the linden or lime-tree]: the lime-tree or linden, whose inner bark, called bast or bass, is tough and fibrous, and is manufactured into Russian mats; the *Tilia Europæa*, ord. *Tiliăcĕæ*.

TEINDS, n. plu. *tēndz* [Icel. *tiund*, the tenth—from *tiu*, ten (see also TEN)]: in *Scot.*, tithes, originally payable from the produce of lands and cattle: since the Reformation, that portion of the landed property in every parish which is liable to be assessed for support of the parish minister of the established (Presb.) church (see TITHES: COMMENDATOR). TEIND COURT, court having jurisdiction in all matters relating to teinds, augmentation of clergymen's stipends, erection of new parishes, building of new churches, etc.

TEINE, n. *tēn*, or TEYNE, n. *tān* [Icel. *teinn*, a thin bar: Dan. *teen*, a slender rod]: in *OE.*, an ingot of silver.

TEINOSCOPE, n. *tī'nō-skōp* [Gr. *teinō*, I extend; *skopĕō*, I view]: optical instrument invented by Sir David Brewster and formed of two prisms combined in such a way as to correct the chromatic aberration of the light.

TEKELI, *tĕ'kèly'* (properly TÖKELY, *tö'kĕly'*), EMERIC, Count: Hungarian patriot; 1656–1705; b. at the castle of Kasmark, county of Zips; of noble family. His father, Count Stephen, had been implicated in a conspiracy to free Hungary from the rule of Austria; and young T. sought asylum in Poland, where he had large possessions. Abafi, Prince of Transylvania, put him at the head of an army of 20,000 men, with which, 1678, he invaded Hungary. His success forced Leopold I. (1681) to temporize, and thus to gain over a portion of the insurgents. But T., distrusting his sincerity, refused to disarm; and being joined by the Transylvanian prince and the Turks, he was declared by Sultan Mohammed IV. (1682) king of Upper Hungary, and recovered most of the country. T. joined Kara Mustapha in his inroad on Austria; but after the failure of the expedition, the sultan turned against him, and he was imprisoned by the Turks; and during his detention, Hungary was overrun by the Austrians, and Transylvania separated from the Turkish alliance. T., however, at the head of a Turkish force, burst into Transylvania 1690, and routed the Austrians and natives; but the imperialists so completely defeated his Turks at Zenta (1697, Sep.) that they agreed to the peace of Carlovitz (1697, Nov. 14), by which all aid to the Hungarian malcontents was withdrawn. From this time, T. lived in retirement in Turkey: he died at Constantinople.—His wife, HELENA, widow of Ragotsky, was renowned over all Europe for her beauty; and was no less distinguished for heroic bravery, as was proved by her obstinate defense of her castle of Mongatz (Hung. *Munkacs*) against an army of imperialists. Forced to surrender, to save the lives of her children and the property of her (Ragotsky's) family, she was afterward exchanged for an Austrian gen. whom T. had captured; and joining her husband at the cost of abandoning her children, shared his vicissitudes until her death, 1703.

TELA, n. *tē'lă* [L. *tēla*, a web]: in *anat.*, any web-like tissue.

TELAMONES, n. plu. *tĕl'ă-mō'nēz* [Gr. *telămōn*, a bearer or supporter]: in *arch.*, figures of men, generally colossal, supporting entablatures: termed also ATLANTES (q.v.).

TELANGIECTASIS, n. *tĕl-ăn'jĭ-ĕk'tă-sĭs* [Gr. *tēlĕ*, distant, remote; *anggeĭ'ŏn*, a vessel; *ektăsis*, extension]: expansion of the remote vessels; a disease of the capillaries, called 'aneurism by anastomosis,' or 'erectile tumor;' a congenital affection, presenting a cutaneous swelling of a circumscribed form.

TELAUTOGRAPH, n. *tĕl-aw'tō-grăf:* a writing or copying telegraph, invented by Elisha Gray, for producing writing or drawings at a distance by means of a receiving-pen, which, directed by a complex mechanism under the control of electric currents, follows the motions of a transmitting-pen operated at the station of the sender. The current-impulses which control the pen at the receiver are regulated by two fine silk cords, which shorten or lengthen according to the motion of the pencil at the transmitting-instrument. The writing or drawing is done at the transmitter on a roll of paper drawn over cylinders, and arranged so that it can be shifted forward as required by means of a small lever. The receiving-pen is a glass tube small enough to draw a writing-fluid by capillary attraction, and is held at the lower end by two aluminum braces, at right angles to the surface of the paper, one of these braces supplying ink to the pen through a rubber tube. The receiving-pen moves simultaneously with the transmitting-pencil, reproducing all its lines, etc., whatever may be written or drawn. In furnishing the current an ordinary telegraphic battery may be used.

TELEDU, *tĕl'ē-dū* (*Mydaus meliceps*): a quadruped of the Weasel family (*Mustelidæ*), native of the mountains of Java, at an elevation of 7,000 ft. and upward; remarkable, like the Skunk (q.v.), of America, for the excessive fetor of a volatile secretion formed in glands situated a little within the rectum, the emission of which is its principal defense.

TELEGRAM, n. *tĕl'ē-grăm* [Gr. *tēlĕ*, at a distance; *gramma*, that which is written, a letter]: a message or dispatch conveyed by means of electricity sent through a wire; a communication sent by Telegraph (q.v.). To MILK A TELEGRAM, to surreptitiously make use of one in its transmission to its owner. *Note*—This word, coined by a writer in the London *Times*, is open to criticism as formed not according to the law of Greek compounds, which would give instead *telegrapheme*. But its convenient conciseness and long and wide usage have given it standing.

TELEGRAPH, n. *tĕl'ē-grăf* [Gr. *tēlĕ*, far, at a distance; *graphō*, I write]: any contrivance for conveying intelligence to a distance, formerly effected by visible signals (see BEACON: SEMAPHORE: SIGNALS); but now specifically by means of a current of electricity sent through a wire (see TELEGRAPH, ELECTRIC): V. to convey or announce by telegraph. TEL'EGRAPHING, imp. TEL'EGRAPHED, pp. *-grăft.* TEL'EGRAPH'IC, a. *-grăf'ĭk*, pertaining to or communicated by a telegraph. TEL'EGRAPH'ICALLY, ad. *-lĭ.* TELEGRAPHY, n. *tē-lĕg'ra-fĭ*, the art or practice of communicating intelligence by means of a current of electricity; the science of telegraphs or of the art of constructing them. TELEGRAPH CABLE, cable consisting of several strands of wire rope incasing a line of copper wire protected by some insulating and protecting material—for use in submarine telegraphy. TELEGRAPHIST, n. *tē-lĕg'ra-fĭst* or *tĕl'ē-grăf'ĭst*, one who works a telegraph; one skilled in telegraphy. DUPLEXTELEGRAPHY: DUPLEX TELEGRAPHY: QUADRUPLEX TELEGRAPHY (see TELEGRAPH, ELECTRIC). POSTAL TELEGRAPH (see POST-OFFICE). RAILWAY TELEGRAPH (see TELEGRAPHY, TRAIN: also LOCOPHONE).

TEL'EGRAPH, ELECTRIC: apparatus employed to send messages or intelligence to distant places by means of a current of electricity transmitted along a wire. The public use of the electric telegraph dates not earlier than 1846; but the idea that magnetism could be applied for distant communication is at least two centuries and a half old. Galileo, in one of his dialogues on the rival astronomical systems, 1632, puts into the mouth of one of his speakers, a reference to a secret art, by which, through the sympathy of a magnetic needle, it would be possible to converse across a space of two or three thousand miles. In 1753, a letter in the *Scots Magazine* suggested a method of conveying intelligence by electric currents through 26 wires—one for each letter of the alphabet: each current was to cause its respective letter marked on paper, etc., to rise at the terminal station. From about the middle of the 18th c. to 1837, many prosposals are on record.

The following is an outline of the more recent history of the T., with description of its principal instruments and processes.—See ELECTRICITY: MAGNETISM: and various references under those titles.

T. instruments may be classed under two heads; those which record the signals, and those which give only passing signals to the observer or listener. Among the former are several kinds; namely, those giving a record in arbitrary signs (i.e., in the dots and dashes of the Morse alphabet); those which print in ordinary characters; and lastly, those giving a *fac-simile* of the message. The last two classes are not much used. The great bulk of the telegraphing of the world is either by the Morse printer, or by the non-recording instruments; therefore this description pertains mostly to these. (See MORSE, SAMUEL F. B.).

The Morse.—The leading principle in the Morse and allied instruments is, that by depression of a key or other method, an electric circuit is 'closed' or completed, and

a signal is transmitted along the wire to the distant station, where, on its arrival, it reproduces the signal by action of an electro-magnet or otherwise. Electrically, the Morse consists of the transmitting key (fig. 2) and the electro-magnet and armature (fig. 1); while mechanically, it consists of a lever, with circular wheel or disk, attached to the armature, and a clock-work arrangement, by which the paper tape to be printed upon is carried forward under the

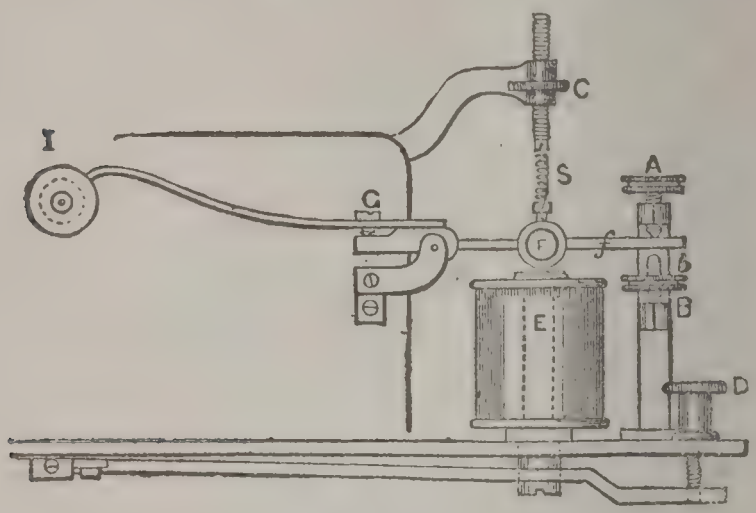


Fig. 1.

disk. Fig. 1 represents the electro-magnet and armature by which signals are received. On the current being received from the distant station, it traverses the coils of the electro-magnet E, and the armature F is drawn down by action of the current. A and B are screws for regulating the play of the armature, and of the inking-disk I, at the other end of the lever. The instrument clerk is required first to adjust B so that the upper edge of the disk shall press gently against the paper tape (not shown in the engraving), and the screw A, so that the under surface of the disk shall dip into the ink-well or reservoir (omitted in the diagram). B having been adjusted, the screw D is turned so that when the brass stop *f* rests on the stud *b*, the poles of the magnet shall clear the armature without actually touching it: a thin streak of light should be seen between the armature and the poles. Screw C is used to adjust the spiral spring above, by which, on cessation of the electric current, the armature is drawn back and the disk ceases to mark the paper. In many Morse instruments the marks were made on the paper with a pointed style (the *embosser*); but by the invention of the ink-writing arrangement of Siemens, which we are now considering, the legibility and permanence of the record are secured, besides the advantage that a very light current serves to make the marks. The case containing the clock-work, the arrangement of wheels by which the paper tape is unwound and carried forward, and the switch, by which the running of the tape is stopped, are not shown in the figure. The passage of a current draws down the armature, and elevates the disk, causing a straight mark on the tape so long as the current

flows. When it ceases, the spring S draws back the armature as above described, and the mark is discontinued. Thus the duration of the current determines the nature of the mark, a momentary passage causing a dot, a longer depression of the key a dash; and as the alphabet invented by Prof. Morse consists of dots, dashes with spaces, and combinations of the three, the above figure and explanation disclose the whole mystery of this system of telegraphy to those who have mastered the phenomena of electricity.

The Morse Alphabet.—This alphabet is universally recognized as a master-piece of cryptography. There are two codes, the American and Continental (European); the latter is also the English code.

The following is the American Morse code :

A ·—	J —·—·	S ···
B —···	K —·—	T —
C ·· ·	L ——	U ··—
D —··	M — —	V ···—
E ·	N —·	W ·— —
F ··—·	O · ·	X ·—··
G — —·	P ·····	Y ·· ··
H ····	Q ··—·	Z ··· ·
I ··	R· ··	& · ···

1 ·— —·	6 ·····	Period ··— —··
2 ·· —··	7 — —··	Comma ·—·—
3 ···—·	8 — ····	Interrogation —··—·
4 ····—	9 —··—	Exclamation — — — —
5 — — —	0 ———	

The signals, as given below, are those of the Continental system and are arranged in the groups, and accompanied by the mnemonic phrases, adopted by the British post-office when, in 1870, the transfer of the telegraphs to the government rendered necessary the rapid training of thousands of telegraphists throughout the kingdom:

Group 1.		Group 2.	
·	E, Earwigs	—	T, Turnips
··	I, infest	——	M, make
···	S, summer	———	O, oxen
····	H, houses.	————	Ch, cheerful.

Group 3.		Group 4.	
·—	A, A	—·	N, No
·——	W, wet	—··	D, difficulty
·———	J, jacket's	—···	B, baffles
··—	U, uncomfortable,	——·	G, great
···—	V, very !	——··	Z, zeal.

Group 5.		Group 6.	
·—·	R, Remember !	—·—	K, Kindness
·—··	L, law	—·—·	C, conciliates
·——·	P, preserves	—·——	Y, youth
·· ·	F, freedom.	—··—	X, extremely
		——·—	Q, quickly.

The arrangement for the numerals is next given. Each figure is represented by five signals thus:

1, ·—————	6, —····
2, ··———	7, ——···
3, ···——	8, ———··
4, ····—	9, ————·
5, ·····	0, —————

These are the numerals printed long, but on busy circuits expert clerks adopt the practice of 'sending short,' omitting all after the first dash in 1, 2, and 3, four of the dots in 5, and all before the last dash in 7, 8, 9, and 0. It is stated that Prof. Morse founded his alphabet upon information given him by his brother, a journalist (see MORSE, SIDNEY E.) as to the numerical relation of the letters in the Eng. alphabet, the simplest signal (a dot) being given to E, and the next simplest (a dash) to T, those letters occurring most frequently.

The Transmitting Key.—The 'key' or hammer by which signals are transmitted from the operator at the sending office, is shown in fig. 2, in one of its earliest and most simple forms. The lever *l, l* turns on its axis A, and has on its under side two platinum nipples, *m* and *n*. L is the line-wire, connected with the axis; E, the 'earth'-wire (passing through the Morse on its way to earth, and producing its signal there); and C, a wire connecting the stud *a* with the battery. As the key stands in the figure, it is in the position to receive a current from the distant station, the

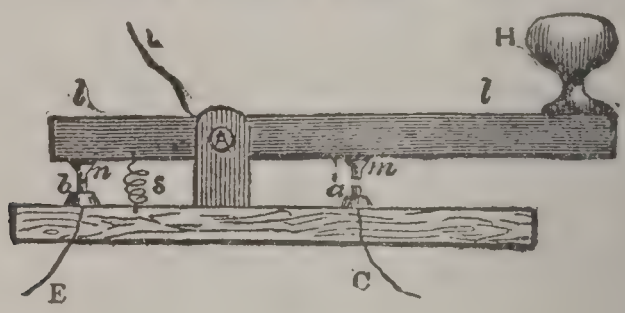


Fig. 2.

course of the current being L, A, *l, n, b,* and thence to the electro-magnet of the Morse *en route* to earth. When it is desired to send a current, the handle H is depressed, and the current, generated in the battery, then comes by the wire C, and passing through *a, m,* and A, proceeds by the line-wire to the distant station. In the various modifications of this key the principle remains the same, that the electric circuit is closed or completed by the depression of the key. The length of time during which the handle is depressed, determines the length of the mark produced at the other end. Thus, if the clerk presses down the handle while he says, 'one—one two three,' the ink-disk or stylus at the other end gives the mark ·— (dot dash) or the letter A; and so on through the alphabet.

The Battery.—For generation of current in the electric telegraph, Daniell's or gravity batteries (see GALVANISM) are chiefly employed in this country. Various forms

of the Bunsen battery also are used here and in other countries. The power employed varies with the length of line, the condition of the wires as regards insulation, and the nature of the instruments used.

The Circuit.—The mode of jointing up two stations by means of earth-wires, batteries, instruments, and line-wires, is shown in fig. 3. Assuming S and S 1 to be telegraph stations, P and P 1 are the 'earth'-plates (see subsequent paragraph), B and B 1 the batteries, *n* and *n* 1 the electro-magnets and armatures, and *b*, *k*, *g*, the transmitting keys and galvanometers. L, L show the line-wire, supported on poles and insulated. The key at station S is shown depressed, so that a current of electricity may be supposed to be passing from the battery B through the key and gal-

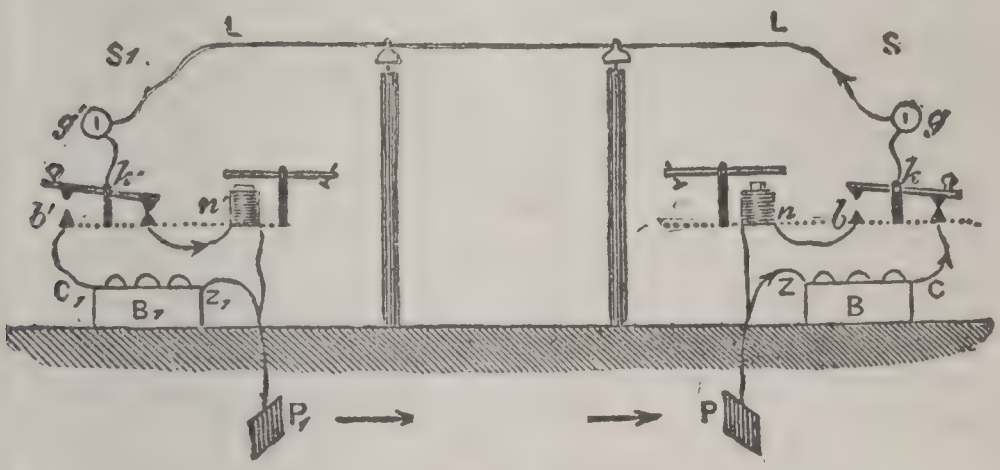


Fig. 3.

vanometer along the line-wire, and thence through *k* 1 and *n* 1 to the earth-plate P 1. Supposing, then, that the clerk at S desires to send a message to S 1, he depresses the key *k* several times so as to send a series of dots and dashes corresponding to the name (or rather the code signal representing the name) of the distant station. The attention of the clerk there being gained by the clicking of the Morse, he turns the switch to set his paper tape in motion, gives the signal that he is ready, and the message is then sent.

The Line.—From fig. 3, some idea may be gained as to the mode of carrying a wire or series of wires over poles. In towns, wires are sometimes carried 'over-house,' or by under-ground conduits or pipes, the wires in the latter case being insulated by a gutta-percha or other suitable covering. The underground method is being applied to extended lines, especially in Germany, and is found to answer as well as the overhead system, while it avoids many of the casualties to which the latter is liable. In pole and over-house lines, the wires are kept from each other and from contact with the earth by insulators of various kinds: glass, white porcelain, and brown stoneware are the chief materials. Porcelain, when of good quality, well glazed, and well burned, is perhaps the most perfect of insulating materials, and does not deteriorate with age. The fewer the poles on which the wires are suspended, the better is the insulation, and the less the cost; but liability to accident is probably

greater. The number of poles used varies from 16 to 30 per mile, and is governed by the number of wires carried, the nature of the route, and other considerations. The wire chiefly used for inland telegraph purposes is of iron, galvanized and of No. 8 ($\frac{1}{8}$ inch) gauge. The conductivity of a wire increases in the ratio of the square of its diameter (the resistance decreasing in the inverse ratio), and the advantage of using a thicker wire on the longer lines is thus seen. No. 4 wire is, for this reason, used on some of the longer lines.

The Earth—Earth Currents.—Mention has been made of the 'earth,' in the preceding description. This is the technical expression used in relation to the fact discovered by Steinheil 1838, that the earth itself will serve the purpose of completing the circuit, and renders the employment of a second or return wire unnecessary. The 'earth' may consist of a buried plate of metal connected with the battery or line-wire, and of sufficient surface to afford the necessary diffusion. The gas or water pipes of a town form excellent 'earths,' care being taken that the connection is made with the pipe itself, and not with a branch, where a badly made joint might spoil the connection. Where dissimilar 'earths' are in use, e.g., a copper plate at one end, and an iron pipe at the other, a *quasi* battery is created, and vexatious currents pass along the line. Hence the 'earths' on a circuit should be alike. The earth, being regarded as a large reservoir of electricity, offers no sensible resistance to the passage of the current, in the same way as the ocean would either receive or supply at any point an indefinite quantity of water. While this quality of the earth is one of the most valuable aids to telegraphy (reducing the cost of wire erection), it presents at times those embarrassing interruptions known as *earth currents.* These currents, at all times unwelcome visitors to a telegraph office, are very variable, changing rapidly at times from positive to negative, altering their direction with the hour of the day, and leaving one circuit to appear on another in a manner not explainable. The lines most liable to such disturbances are those running n.e. and s.w.—i.e., connecting places separated in a straight line in those directions, without reference to the actual direction of the wires. The easiest remedy for earth currents, when they are of sufficient strength to affect the lines, is to dispense with the earth connection, and revert to the original plan of using two wires. Thus between places where there are two wires, both may be disconnected from 'earth,' and used as a complete metallic circuit. Another remedy has been found in extending the circuit by joining to it a further wire, the terminal point of which lies beyond the direction or line in which the earth current is flowing. See the treatises on telegraphy for information regarding lateral induction, the velocity of electric discharge, the tests for resistance, insulation, etc.; also for notices of some of the less prominent pieces of T. apparatus.

The Relay.—Among several methods by which transmission of signals is facilitated or accelerated may be

placed first the *relay*, of which an excellent form is shown in figs. 4 and 5. This is Siemen's Polarized Relay, now in extensive use. In the previous description of the Morse, we have assumed the instrument to be worked directly by the current sent along the line. On long circuits, however,

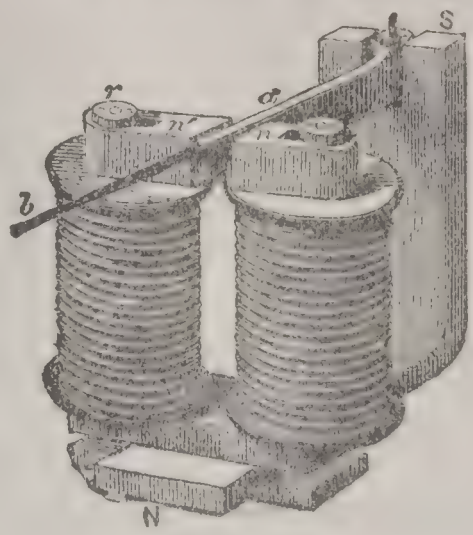


Fig. 4.

direct working could only be accomplished by great battery power, as, owing to inevitable loss by leakage, a current loses greatly before it reaches its destination. It is found much better to have the instrument worked by a 'local current.' derived from a local battery at the receiving-station. The mode by which this is accomplished is shown in the diagrams. In the figures, N S is a hard-steel permanent magnet, whose south end, S, has a slit, in which the soft iron armature, *a*, is pivoted. To this armature a thin aluminium tongue, *b*, is attached, which, by making contact at the point *c* (fig. 5), completes the local circuit. To the north end, N, of the permanent magnet the soft iron cores of the electro-magnet are fixed, as shown in the sketch. When the armature is equidistant from the poles of the electro-magnet, it is attracted equally by both; but if it be brought nearer to one than to the other, it will be held there, because it is under the influence of a more powerfully attracting force. Since the relative distance between the armature and the two pole-pieces may be increased at will, the attraction between either pole and the armature may be regulated with any degree of nicety. The electrical contacts for the local circuit are seen in fig. 5, which is shown with the local circuit completed. When two stations far apart are to be connected by telegraph, it is usual to transmit the signal to a half-way station, and

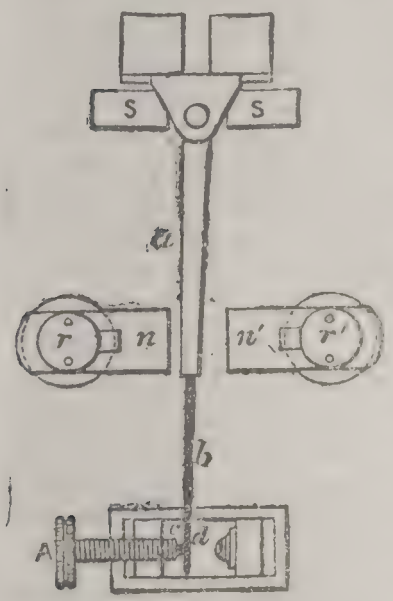


Fig. 5.

thence to retransmit it to its destination. The retransmission is effected not by manipulative skill but by mechanical contrivance, so that, while the half-way station may read the message sent, no time is lost in transmission: this is effected by making the intermediate instrument act as a relay in transmitting a message to the next station. The system to be fully explained would require more detail than can here be given. We shall only show how it is effected, leaving out of account how all the stations can communicate as in one circuit. The current, C_1 (fig. 6), from the sending-station enters the coil M, and goes thence to earth P, and returns as shown by arrow C_1. The instru-

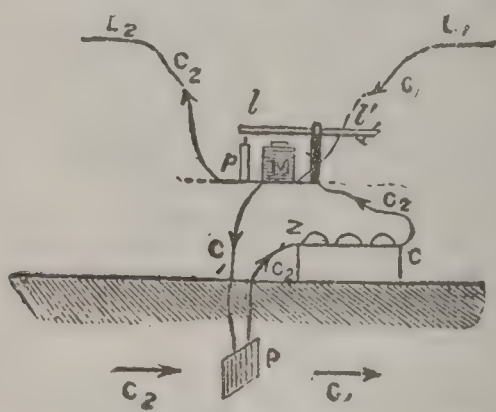


Fig. 6.

ment may record or not as required, but its doing so in no way interferes with translation. The copper pole C, of the battery CZ, is connected with the lever *l l'* of the register, and the zinc pole is to earth. When the lever is drawn down by the current C_1, it strikes against the point at the top of the pillar *p*, that checks its motion. The pillar *p* is joined to the line L_2, running to the further station; and when the lever falls, a second circuit—viz., that of the battery CZ—is closed, in which C, the lever, the pillar, L_2, the further station, the earth, P, and Z, all are included. Thus, as *l l'* prints at the intermediate station, it at the same time sends a new printing-current to the next. When it ceases to print, so does the instrument at the distant station.

Wheatstone's Automatic Transmitter.—The speed of the ordinary Morse instrument is limited to the rapidity with which the hand of the operator can move the key, so as to preserve the proper spacing between the marks at the receiving-instrument. We are indebted to Sir Charles Wheatstone for an apparatus which trebles, and in some cases quadruples, the carrying capacity of a wire, securing, at the same time, mechanical accuracy in the relative size of the dots, dashes, spaces, etc. To effect this, three different instruments are required: First, there is a perforator, by which holes are punched in a paper slip to correspond with the signals required. The operator strikes three disks, the central one producing a central hole, which is of no avail electrically, only carrying forward the paper; the left-hand disk producing two holes, directly opposite each other, on the sides of this central row; and that on

the right producing two holes, placed diagonally to each other. The passage of the electric current is regulated by the position of the outer holes. Those opposite each other admit a momentary passage of the current through the 'transmitter'—used in sending the message—while the holes diagonally placed produce a lengthened mark, corresponding to the dash. The following diagram represents the word 'and,' as shown on the punched slip:

```
 o o     o o o o o o
o o o o o o o o o o o o o o o o o o
 o o     o o     o o o
```

As printed at the other end, this reads:

```
·—     —·     —·
 a      n      d.
```

The third portion of this instrument is the 'receiver,' in which the currents sent by the action of the punched slips in the transmitter are reproduced in the dots and dashes of the Morse code—the printing being, moreover, done with a mathematical accuracy which keying by hand cannot attain. The speed of transmission depends on the length of line and state of the atmosphere; but the movement of the clock-work, both of transmitter and receiver, is capable of adjustment to any speed below 120 words per minute. When the Brit. post-office took possession of the telegraphs of the United Kingdom, the Wheatstone automatic instrument was in use at only four stations. It then came into extended use; and one of its most successful applications was in the simultaneous transmission of news from London to a large number of towns. The punched ribbon was carried from one transmitter to the other, the circuit to Birmingham, Manchester, and Liverpool (on which the highest speed is attained) sending it first, and from that instrument it passed to several others, each serving several towns. The adjustment of 'resistance,' by which a message is run off simultaneously at Edinburgh, Glasgow, Dundee, and Aberdeen by one sending from London (and so through the various transmitters where this system of 'express news circuits' is adopted), forms one of the most interesting objects of study in the practical working of the telegraph. By combining the automatic transmission with Bain's principle of producing marks on chemically prepared paper, an American inventor has accomplished still higher speed, the lever action of the inking disk (fig. 1) or stylus being saved.

Other Instruments.—All that has been said as to the battery, the earth insulation, etc., is applicable to nearly every instrument now in use; the exception being several magneto-electric instruments, such as Wheatstone's 'ABC,' in which the use of a battery is dispensed with, power being generated by two bobbins coiled on an armature rotating continuously over the two poles of a permanent magnet. On the upper surface of this instrument is seen a circle of buttons corresponding to the letters of the alphabet, by means of which levers, arranged vertically in a circle, may

be pressed down. These levers press a pitch-chain into a series of indentations on the periphery of a metal disk, the chain having sufficient slack, so that, when a second lever is depressed, the first must be raised. A series of currents, corresponding to the number of letters between each lever pressed down, is sent into the line, and, operating on two little bent magnets, moves forward a ratchet-wheel having a pointer on the same axis which shows the letter on a dial card. In this way the message is spelled out letter by letter, and as the instrument gives not an arbitrary sign, but the letter itself, it is much used in private telegraphs and for the smaller post-offices in Great Britain. A non-recording instrument largely used in England (excluding private telegraphs) is the single-needle instrument of Cooke and Wheatstone. It consists of an upright galvanometer, with astatic needles, one of which moves within the coil, the other on the front of the dial. The needles are loaded at the lower end, to maintain them perpendicular when no current is passing. The instrument is worked by means of two keys like those of a piano, a deflection of the needle to right or left being effected by depressing one or other of the keys. The signal is shown both on the sending and receiving instrument. The Morse alphabet is used, a deflection to the left corresponding to the dot, and one to the right representing the dash.

Acoustic Telegraphy.—Before the introduction of high-speed automatic instruments for the more important circuits, expert telegraphists in many cases dispensed with the reading of the printed slip, reading by the sound, which, by long practice, became a language perfectly intelligible to them. The great advantage of this was, that the use of the eye was obtained exclusively for the task of writing down the message. A simpler acoustic telegraph, called the 'American sounder,' a great favorite for its cheapness and efficiency, has been brought into use. This instrument is, shortly stated, the Morse without its wheel-work and ink-printing apparatus; and its whole construction is shown in fig. 1, omitting the inking disk. The sounder is placed on the local circuit. As the message comes in, the armature flies back and forth, giving two sounds—the stroke and 'back-stroke'—which give the Morse code to the operator's ear. All telegraphers in this country now work by ear, the recording apparatus being used only in exceptional cases. In Sir Charles Bright's 'bell' instrument, most admirable results, in speed, have been attained. The bells, different in sound, are placed at the two sides of an upright instrument, so that the clerk, bending forward to write, may concentrate his attention on that duty, translating in his mind the tinkle of the hammers as they ring out their message. The bells are now worked in the Morse code—the left bell a dot, and the right bell a dash; but when first introduced, the instrument had a code of its own, based on the desire to complete each letter as much as possible on one bell. For a description of the type-printing and *fac-simile* instruments, see treatises on the telegraph and its history.

Duplex Working.—The fact that two currents may be sent simultaneously (one from each end) has been long recognized by electricians, but the principle of the duplex was revived and patented by Stearns, an American, 1872. At first the duplex working was tried only on short circuits of 40 to 60 m.; but it is now in daily use on every busy circuit, long or short. The principle of the duplex system is, that the current sent on the depression of the key is divided into two parts, one half being carried through one pair of coils in a differential galvanometer to the line, and the other half through the other pair of coils to a resistance coil, and thus to earth. The resistance of the latter is made exactly equal to that of the line-wire, and the instrument of the sender being so placed that this divided current presses equally in each direction, this instrument remains unaffected, while the armature at the other end responds to the signal sent. At the same time a telegraphist at the other end is sending a current, which is divided in like manner, and leaves his own instrument unaffected while operating on the armature of the first instrument. The two currents on the line-wire assist or oppose each other in such a way as to affect the equilibrium in the differential galvanometer, but each operates only on the distant instrument. Duplex working led to *diplex*, that is. two messages passing over a wire in the same direction at once; and to this has followed quadruplex and multiplex telegraphy. Quadruplex working was perfected 1876 by Prescott, Edison, and Gerritt Smith; but its possibility had been suggested by Stark of Vienna, 1855. An illustration of the value of these additions to the wire power is afforded by a wire from Chicago to Pittsburgh, 550 m., which is quadruplexed, and at Pittsburgh branches off in two duplex circuits to Baltimore and Philadelphia, giving Chicago duplex communication with these two places.

Multiplex Telegraphy and 'Phantom' Circuits.—The most original feature of the telegraph section of the Paris Exhibition of 1878 was the Harmonic Telegraph of Haskins and Gray, based on principles laid down by Cromwell Varley 1870. In one application it occupies a place midway between duplex and multiplex telegraphy, namely, in the 'way duplex,' felicitously termed the 'phantom circuit.' A wire may be occupied by the ordinary business of a series of intermediate offices, while there may be superimposed on that a through traffic (which can be duplexed) between the terminal stations. Thus between Chicago and Dubuque a wire provides for 17 intermediate stations, working ordinary Morse sounders, while the harmonic telegraph (the principle of whose action is vibratory currents sent and received by musical forks tuned in unison) works between the terminals. By an extension of this principle we have the multiplex telegraph, each fork taking off at the receiving end those vibrations corresponding to its own tone.

The Telegraphic Pen.—Among many attempts at an autographic telegraph, that of Cowper, made public 1879.

is the most successful. It has the drawback of requiring two wires, but is so beautiful in its action as to deserve notice. Two series of resistances are ranged like the letter L, one series affected by lateral, the other by the up-and-down motion of the sender's pen. At the other end, a siphon recorder moves in accordance with the currents thus sent, giving on a moving slip of paper an exact *facsimile* of the writing or other marks of the person sending the message.

Telegraph Lines in the United States.—In 1896 the Western Union Telegraph Co., which owned or leased nearly all the telegraph lines in the United States, had control of 189,918 m. of line, 826,929 m. of wire, and 21,725 offices. The receipts were $22,612,736, expenditures $16,714,756, profits $5,897,980. The average toll per message was (1868) $1.04; (1890) 32·4 cts.; (1896) 30.9 cts.

Postal Telegraph.—In Great Britain the public introduction of telegraphy was in 1846 by the Electric and International Telegraph Company. Subsequently other companies were established. In 1868 and 9 acts were passed transferring the property of the telegraph companies to the post-office, and giving that department a monopoly in the conduct of telegraph business within the kingdom. The task set before the post-office was to reduce and simplify the charges, to separate entirely the public wires from wires used for railway purposes, to extend the telegraph to outlying places and to business parts of towns, and to establish an open trade in press telegraphy—i.e., that, instead of collecting and supplying news as the companies had done, the department should arrange only to transmit news, at specified rates, for all comers, leaving the newspapers to make their own arrangements for obtaining information. The great progress of telegraphy in the hands of the postal telegraphs dept. is one of the social features of the time. Including a large number of new offices prepared for opening on the occasion, the post-office started 1870 with 1,007 T. stations, with about 1,900 railway stations receiving messages. In 1880 the number of offices belonging to the post-office was 3,924, making, when the railway stations are added, a total of 5,331 offices. The railway offices take in from the public only 7 per cent. of the messages sent. The number of telegraphic messages 1895–6 was 78,839,610. The mileage of telegraphs increased 1870–95 from 5,651 m. (48,990 m. of wire) to 33,062 (193,095 of wire), besides 27,880 m. of private wires, for which rents are paid to the department. In 1895–6 there were 7,409 T. offices connected with the post-office dept., and 2,252 with the railways—total 9,661. The aggregate of messages, excluding foreign, press, and free, was 71,589,064; and the deficiency in the working of the system was $2,200,622 against $1,068,791 in 1890. The department also operated 28 telephone exchanges in country towns with 1,370 subscribers.

The average cost per message has been reduced about one-half since the government assumed control in 1870, while in the U. S. the reduction by the Western Union has been over two-thirds in the same time, but owing to our greater distances is still about 50 per cent. higher than in England.

Submarine Telegraphy.—From 1839, when Dr. W. O'Shaughnessy transmitted signals through a copper wire insulated with cotton thread dipped in pitch and tar, across a river at Calcutta, the progress of submarine telegraphy has been as remarkable as that of telegraphy on *terra firma*. For a history of construction see ATLANTIC TELEGRAPH. In 1877 the task of duplexing a submarine cable was accomplished by Muirhead on the Aden and Bombay cable of the Eastern Telegraph Company, and in 1877–8 Mr. Stearnes successfully duplexed the cables from Newfoundland to Ireland, and all important lines are now duplexed. Owing to the retarding influence of a long submarine cable, by which it becomes difficult to pass ordinary electric currents through the cable except at very long intervals, special means have to be adopted to obtain the maximum speed. The method usually adopted was invented by C. F. Varley, and consists in interposing a condenser in the receiving circuit, so that instead of the circuit being complete it is interrupted at the condenser; and the instrument—a very sensitive form of galvanometer devised by Lord Kelvin (Sir William Thomson)—is actuated merely by the charge and discharge of the condenser. The Thomson galvanometer, without which long cables could scarcely have been commercially successful, consists essentially of a magnet composed of one or more pieces of watch-spring, ⅝-inch in length, cemented upon a small circular convex mirror of silvered glass, suspended by a short thread of cocoon silk without torsion. This needle is suspended in the centre of a coil of very fine wire, and a ray of light is projected from a lamp upon the mirror. The beam of light is reflected at some distance upon a scale, and a very minute movement of the mirror therefore produces a considerable movement of the ray projected upon the scale. The movements of the spot of light upon the scale are read off in precisely the same way as the motions of the pointer on the dial of a single-needle instrument. The ordinary Morse system on an Atlantic cable could scarcely have a speed of one word a minute, while fifteen words is a usual speed with the reflecting galvanometer, and twenty-four have been obtained. Lord Kelvin also invented in 1867 the *Syphon Recorder*, by which cable messages can be permanently recorded: this is now extensively superseding the mirror instrument.

In 1897 there were 310 cables owned by corporations with 139,754 nautical m. of cable, and 994 short govt. cables amounting to 18,132 nautical m. There were 12 cables between N. America and Europe with an aggregate of 35,334 m., including the short cable connections. There are also direct cables between Europe, India, China, Japan, Australia, South Africa, and South America. In 1882 was completed a submarine line, 3,100 m. in length, between Lima and Vera Cruz in Mexico,

crossing the isthmus of Tehuantepec by a land line of 220 m.; it thus connects the S. American Pacific coast with the United States.

TELEGRAPHY, SYNCHRONOUS, *sĭn'krō-nŭs tē-lĕg'ra-fĭ:* a system of multiplex telegraphy (see TELEGRAPH), of which the following gives the outline. Two wheels at the opposite ends of the main line are kept in absolutely synchronous rotation electrically. Each wheel carries a rotating arm or trailing contact, which at each rotation of the wheel comes in connection with a series of stationary contact pieces, alternately grounded and insulated, and distributed symmetrically around both wheels: a grounded contact at one end corresponds with an insulated contact at the other. Telegraph instruments are connected to the different contacts, and the wheels in operation rotate so rapidly that each pair of instruments works independently of all the others, utilizing the line only in the little fractions of seconds afforded by the arm as it rotates, but which fractions succeed each other so rapidly as to act like a regular connection. Thus each instrument has the line entirely to itself during these intervals; but as many as 72 separate printing circuits have been maintained by one main line.

TELEGRAPHY, TRAIN: system for transmitting messages telegraphically from a moving train to a telegraph line by the side of the track, without any contact: see LOCOPHONE. The static system of W. W. Smith and Thos. A. Edison operated by charging and discharging the roof of the car, and thus affecting the line. The operations of charging and discharging followed each other with extreme rapidity, and were split up into 'dots and dashes.' A telephone receiver took the place of a sounder. The dynamic system of Willoughby Smith and Lucius J. Phelps provided the car with a coil of insulated wire, which was in circuit with a key and battery. By electro-magnetic induction, Morse signals were sent and received. An induction coil was generally recommended, and the metallic car-roof and tie-rods under the car were used as elements of the coil. Train telegraphy is not now employed, not having proved of sufficient practical value.

TELEMACHUS, *tē-lĕm'a-kŭs:* in ancient legend, son of Odysseus (see ULYSSES) and Penelope (q.v.). He was an infant when his father left home to join in the war against Troy, but during the latter's absence of about 20 years grew into manhood. At the instigation and under the guidance of Athene (Minerva), who had assumed the appearance of Mentēs (commonly known as Mentor, L., 'the thoughtful one'), King of the Taphians, his father's dearest friend, T. set out in search of his long-lost sire, after having vainly endeavored to eject his mother's troublesome suitors from the house. Having visited Pylos and Sparta, where he was hospitably entertained, T. returned home to Ithaca, where he found his father in the guise of a beggar, living with the swine herd Eumæus. After mutual recognition, father and son proceeded to slay the suitors.—In modern times, T. is known chiefly as the hero of Fénelon's

romance, *Télémaque*, once very popular as a school-book (see FÉNELON).

TELEMETER, *tē-lĕm'ē-tĕr* [Gr *tēle*, and *metron*, measure]: instrument for measuring distances in surveying, in artillery practice, etc.; also, apparatus for electrically indicating and recording at a distance the indications of instruments such as the barometer, wind-gauge, etc. TELEM'ETRY, measurement of distances; art of employing the electric telemeter.

TELEMICROPHONE, n. *tĕl-ē-mī'kro-fōn* [from *telephone* and *microphone*]: combined apparatus simultaneously producing the effects of the microphone and the telephone, and reversible like the latter.

TELENGISCOPE, n. *tē-lĕn'jĭ-skōp* [Gr. *tēlĕ*, afar off; *enggus*, near; *skopeō*, I see]: instrument combining the powers of the telescope and microscope.

TELEOLOGY, n. *tĕl'ē-ŏl'ō-jĭ* [Gr. *telos*, an end; *logos*, a word]: the doctrine of final ends or causes. TEL'EOL'OGIST, n. *-jĭst*, one who seeks for or studies the final causes of phenomena. TELEOLOGICAL, a. *tĕl'ē-ō-lŏj'ĭ-kăl*, relating to or connected with final causes. TEL'EOLOG'ICALLY, ad. *-lĭ*. —*Teleology* is a doctrine brought into philosophic discussion by Aristotle. The idea of a final cause or end entered into the Aristotelian conception of physical science; but it enters more properly into ethical science or morality (see END, in Ethic: ETHICS). All the ancient systems of morality, from Socrates downward, correctly regarded T. as a *practical* science; they started with the inquiry, 'What is the proper and final end of all human conduct?' and the answer given by each school was the characteristic doctrine of the school. Aristotle answered, 'Happiness, in a peculiar sense;' the Stoics said, 'A regard to the whole universe of being;' the Epicureans, 'Pleasure and the absence of pain.' John Stuart Mill, in the concluding chapter of his *Logic*, entitled, 'The Logic of Practice, or Art; including Morality and Polity,' adopts the ancient (ethical) point of view, and observes that there should be a science of ends, or a reasoned statement of the final purpose of all human action; for this science he suggests the name T., remarking that it corresponds to what the Germans call the practical reason. There would be comprehended under it the art of living or happiness, taste or the beautiful, morality, and politics: see CIVILIZATION.—In philosophical theology as distinguished from ethics, T., in the sense of the science of adaptation to a purpose, is applied to the argument from design in proof of the existence of God—the evidences of design in the universe being held to show a designer—i.e., to point to God as the ultimate cause of all things (see under the title GOD). For a discussion of this subject under recent aspects, see Paul Janet's *Final Causes*. This is in keeping with Aristotle's use of the word in physics.

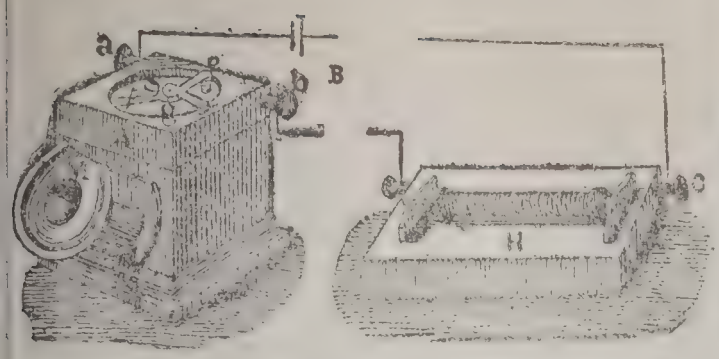
TELEOSAURUS, *tĕl-ē-ō-saw'rŭs*: genus of fossil crocodiles, whose remains occur in the Oolitic rocks. They are found associated with marine fossils, and the peculiar

modification of their skeleton seems to have fitted them specially for an aquatic life. Both surfaces of the vertebræ were slightly concave, the hind legs were large and strong, and the anterior portion of the body gradually tapered into the long and slender jaws, giving the animal the aspect of the gavial of the Ganges, only the jaws were more attenuated, and the nasal aperture, instead of being oblique, opened vertically on the truncated end of the upper mandible. The jaws were armed with numerous equal and slender teeth, slightly recurved, and admirably adapted for capture of fishes.

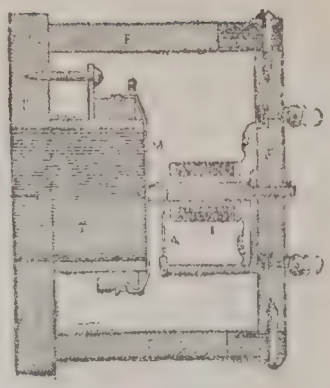
TELEOSTEI, n. plu. *tĕl'ē-ŏs'tē-ī* or *tē'lē-* [Gr. *telĕŏs, teleĭ'ŏs*, perfect; *ŏstĕon*, bone]: an order of fishes having a complete bony system; typical fishes, forming the third and highest sub-class, as separate from Sharks and Ganoids (q.v.). The skeleton is bony, not cartilaginous; the skull of numerous parts, though mostly fused together; the gills usually in four pairs, with several opercular bones. There are 8 orders: Opisthomi, Apodes, Nematognathi, Scyphophori, Teleocephali (including the common and edible fishes), Pediculati, Lophobranchii, and Plectognathi (q.v.). See FISHES, CARTILAGINOUS FISHES: ICHTHYOLOGY: VERTEBRATA: ZOOLOGY.

TELEPATHY, n. *tē-lĕp'a-thĭ* [Gr. *tēle*, afar; *pathein*, to feel, to suffer]: communication of states of mind directly and immediately (without word, gesture, or any other recognized physical medium) from one person to another. The London Soc. for Psychical Research has investigated a very great number of cases of alleged T. (or thought-transmission) between persons at wide distances apart, and has published these cases with fullest details in its *Proceedings* (q.v. *passim*). A scientific discussion of the facts, with abundant citation of cases is found in *Mental Suggestion*, by Dr. Julian Ochorowicz (New York 1891). The German philosopher Schopenhauer considers the fact of T. from the point of view of his own system, and presents a highly interesting and ingenious argument to show that this supposed supernatural power is not only entirely natural, but in fact 'more natural' than mediate communication between minds: see his *Der Wille in der Natur*, translated into English, *The Will in Nature*, in Bohn's Philosophical Library.

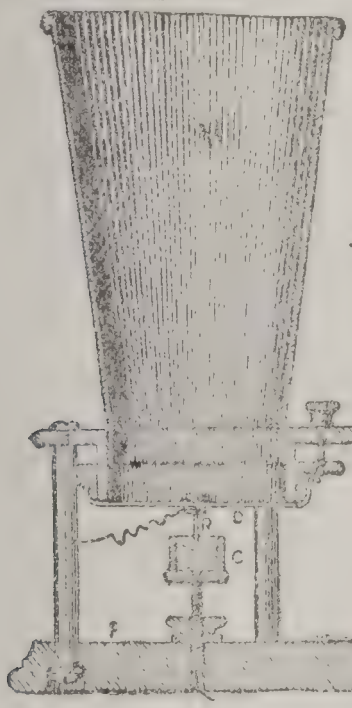
TELEPHONE, n. *tĕl'ĕ-fōn* [Gr. *tēlĕ*, afar off; *phōnē*, a sound]: instr. by which articulate speech or musical sounds can be transmitted instantaneously, and with distinctness, to almost any distance, by means of currents of electricity: V. to transmit speech by the telephone. TELEPHONIC, a. *tĕl'ĕ-fŏn'ĭk*, conveying or sending sound to a great distance; transmitted by telephone. TELEPHONY, n. *tĕl-ĕf'ŏ-nĭ*, the art of transmitting sounds by telephone. TELEPH'ONIST, n. *-ŏ-nĭst*, one versed in telephony.—The *Telephone* is a recent development of a principle in the transmission of sound. In 1837 Dr. C. G. Page, of Salem, Mass., made an important discovery as to the sound from an electro-magnet coincident with closing or breaking the



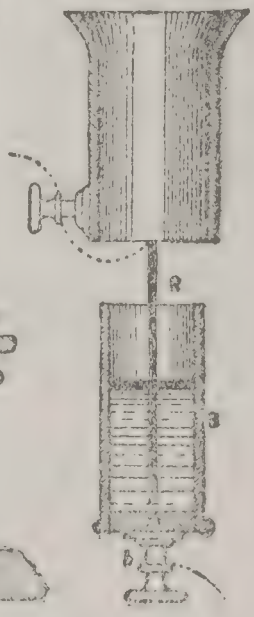
Reis's Telephone.



Bell's First Telephone.

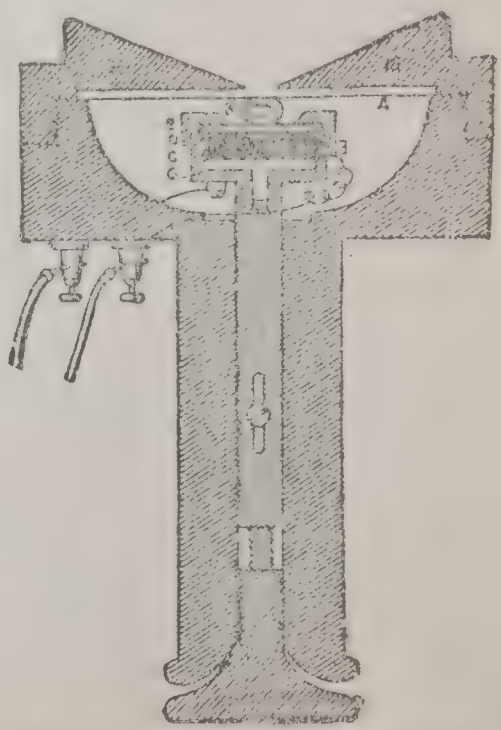


Bell's Liquid Transmitter.



Gray's Liquid Transmitter

Bell's Hand Telephone, present form.



Edison's Microphone Transmitter.

electric current, and discussed (see *Silliman's Journal*, XXXII., XXXIII.) the musical note produced by rapid revolution of the armature of an electro-magnet in front of the poles. In 1854 Charles Bourseul published in Paris an article on the electric transmission of speech. In 1860 Reis of Frankfurt first applied the principle of the T., using a membrane which, vibrating under the action of sound, caused pulsations of electricity to pass along the wire, and actuated the armature of an electro-magnet, which, mounted on a sounding-board, reproduced a sound corresponding in pitch and rhythm with the original: the quality of the sound, however, was entirely lost. There are several claimants for priority in the discovery of the principle of the articulating T.; and the discoveries of Elisha Gray (q.v.), of Chicago, and Alexander Graham Bell (q.v.), resident in Boston, appear to have been nearly contemporaneous, and attained by different lines of study. The articulating T. of Bell, shown first at the Philadelphia Centennial Exhibition, is now of very simple construction. A small bar magnet, with a coil of wire round one end, is placed close behind a diaphragm of iron, ferrotype metal, the whole being inclosed in a case furnished with a mouthpiece. Words spoken into the T. are reproduced faithfully on a similar instrument at great distances, and by the use of the Microphone (q.v.) the most minute sounds have been distinctly heard and even magnified. Many extraordinary results have been achieved in conveying and reproducing sounds; and self-caught sounds from 'induction' in the wires have produced interesting results. A controversy exists whether the sounds in the receiving T. are vibratory or molecular, or a combination of both.—The well-known name of Edison is connected with improvements in the instrument.

A single company (the Amer. Bell T. Co.) had (1896) a monopoly of all the telephone business in the United States. It owned 674,976 telephones, 927 exchanges, and 459,728 m. of wire; had 11,930 employees and 281,695 subscribers; had $21,500,000 in capital stock and paid $2,502,453 in dividends, 1895.

TELEPHORUS, *tē-lĕf'ō-rŭs:* genus of coleopterous insects, of sub-order *Pentamera*, section *Serricornes*. The body is long, narrow, depressed, soft, and somewhat flexible. The species are numerous. The larvæ dwell in moist earth, and devour small insects and their larvæ. The perfect insect feeds on similar food.

TELERADIOPHONE, *tĕl-ē-rā'dĭ-ō-fōn* [Gr. *tēle*, and *radiophone*]: a radiophone designed to work in conjunction with a telegraph line: see RADIOPHONE: PHOTOPHONE.

TELERPETON, *tē-lĕr'pē-ton:* remarkable genus of fossil reptiles, whose relics have been found in fine-grained whitish sandstone quarried at Cummingston, near Elgin, Scotland. A single specimen is all that has been detected. The bones have disappeared, and left only the casts as cavities. Prof. Owen has named it *Leptopleuron lacertium*.

TELESCOPE, n. *tĕl'ĕ-skōp* [Gr. *tēlĕ*, afar off; *skōpĕō*, I view]: instr. employed to assist the naked eye in viewing distant objects, especially the heavenly bodies: V. to slide or be driven into each other, as the parts of a telescope which slide into each other—especially said of railway trains in collision. TEL'ESCOPING, imp. TEL'ESCOPED, pp. *-skōpt*, driven, one within the other, e g., colliding railway carriages. TEL'ESCOP'IC, a. *-skŏp ĭk*, or TEL'ESCOP'ICAL, a. *-ĭ-kăl*, pert. to a telescope; visible only through a telescope, as a star; far-seeing. TEL'ESCOP'ICALLY, ad. *-lĭ*. TELESCOPY, n. *tĕl-ĕs'kō-pĭ*, the art or practice of using or making telescopes.—The *Telescope* consists essentially of a Lens (q.v.) or mirror, to form, within our reach, an image of a distant object; and a Microscope (q.v.), to examine this image in detail. Its invention is ascribed to various individuals living about the end of the 16th c.; but there is no doubt that Galilei (q.v.) was the first to apply it to any purpose other than the gratification of curiosity.

It is proposed here to give, *first*, a general idea of the mode in which a telescope acts, incidentally showing how the magnifying power and the brightness of the image depend on the dimensions of various parts of the instrument; *second*, to point out the various causes of imperfection, which in all telescopes are unavoidable, and how these are reduced to as small an amount as possible; *third*, to mention the most important of the many forms which have been devised, and the processes of constructing these delicate instruments.

When a lens is employed, as in a camera obscura, to form an image of an object, as AB in fig. 1, the distance

Fig. 1.

of the image from the lens depends on the focal length of the lens, also on the distance of the object. Practically, with telescopes, the distance of the image from the lens is, on account of the remoteness of the object, the focal length of the lens. Also the image of any point, A, of the object lies in the prolongation of the line joining A with the centre, C, of the lens. Join AC, and produce it to *a*, C*a* being made equal to the focal length of the lens, *a* is the

Fig. 2.

point at which the image of A is formed. Similarly at *b* the image of B is formed. Thus the image is *inverted;* and, seen from C, the image and the object subtend equal angles, or look equally large. When a concave mirror

forms an image, the effect is as in fig. 2, where C is now the centre of the sphere of which the mirror is a portion. When the object, AB, is at a great distance, the image, *ab*, is *inverted*, and is formed half way between C and the mirror. As before, object and image subtend equal angles at C. To see these images, the eye must be placed at some such point as E in each of the figures.

So much for the formation *within our reach* of an image of a distant body. We must next show the action of a lens when employed to magnify this image. When an object, as *ab* in fig. 3, is placed rather nearer to a lens than its focal length, rays which pass from the object through the lens appear to have come, not from the object, but from an enlarged image as $\alpha\beta$, at a greater distance from the lens —but subtending, as before, the same angle at the centre, *c*, of the lens. In practice, the lens is so adjusted as to form the image, $\alpha\beta$, at a distance of about ten inches from *c*, in which case the eye sees it most distinctly, and the distance of *ab* from the lens is then (practically) the focal length of the lens.

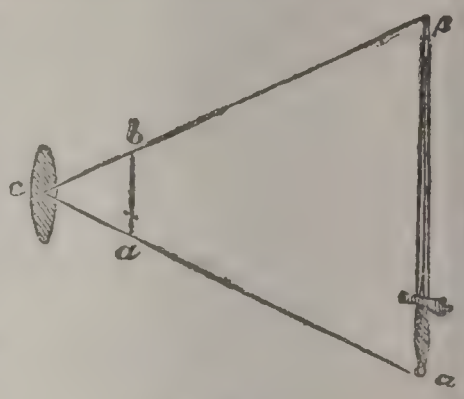


Fig. 3.

We now combine the first and third diagrams, and we have the *Common Astronomical Telescope.* The magnifying power is obviously to be measured by the increase in the angle subtended by the image, $\alpha\beta$ (fig. 4), over that subtended by the object AB. The angle at C is the measure of the apparent size of the object; that at *c*, of the apparent size of the image. And it is easy to see from the quadrilateral C*acb* in the figure that these angles are inversely as the sides C*a* and *ac* (for instance, if C*a* have six times the length of *ac*, the angle at C will be only one-sixth of that at *c*). Hence the magnifying power is to be found by dividing the focal length of the object-lens by that of the eye lens. In practice, the lenses are so mounted in tubes that their distance may be increased or diminished at pleasure. When the object, AB, comes nearer the observer, its image, *ab*, is formed *further* from

Fig. 4.

the lens C. Hence, for near objects, the telescope requires to be pulled out. Again, the distance of most distinct vision differs for different people, so that even when AB

is at a fixed distance, short-sighted and long-sighted eyes require the eye-lens to be removed from, or advanced to, *ab*, so that for each eye $\alpha\beta$ may be formed at the distance at which it can be most distinctly seen.

To estimate the relative brightness of the image and object, suppose, for simplicity, all the light which enters the telescope from the object to reach the eye. Then the quantity of light which enters the eye from the image, is greater than that which would enter the unaided eye from the object, in the ratio of the aperture of the object-glass, C, to the aperture of the pupil of the eye. But it is spread over a magnified image. If the image be as much larger than the object as the object-glass is larger than the pupil of the eye, the object and image will appear equally bright. Taking the aperture of the pupil as $\frac{1}{10}$ inch, the object-lens would require an aperture of 10 inches, with a magnifying power of 100 times, in order that brightness should not be lost. Practically, the most formidable difficulty in attaining very high magnifying powers is that due to the enormous sizes of lenses and mirrors which are required to give the necessary brightness to the enlarged image. It is easy to see that it is impossible to render the final image brighter than the object, by any increase of dimensions in the object-lens.

From the above notice of the common astronomical telescope, the construction of the Newtonian or Herschelian reflecting telescope may be understood from a combination of figs. 2 and 3.

We proceed to the second theme—the unavoidable imperfections of the telescope, and their reduction to a minimum.

In the first place, even with a mirror—where we are not annoyed by the breaking up of white light into its component colors, since the law of Reflection (q.v.) is the same for all rays—it is impossible to form a perfectly sharp image of more than *one* definite point at a time. To do even this, the mirror must be formed as part of the prolate spheroid produced by the rotation about its longer axis of an Ellipse (q.v.), one of whose foci is the object-point, the other the image. If the object-point be, like a star, practically at an infinite distance, the requisite form of the mirror is that formed by the rotation of a Parabola (q.v.) about its axis. The axis of the mirror must then be directed to the object-point, and all rays from it will, after reflection, pass accurately through the focus. But this is not strictly true for any other object-point in the field of view, though so nearly true that no practical inconvenience results from it. But, if the mirror used be part of a sphere, no point can be found such that rays diverging from it shall all be brought after reflection accurately to one point of the image; and this defect, called *Spherical Aberration*, increases proportionally to the surface of the mirror; so that by increasing that surface, for attainment of brightness, we increase proportionally the indistinctness of the image. To give an idea of the delicate manipulation required in constructing a reflecting telescope, we take

the case of a speculum of 4 ft. aperture and 40 ft. focus, as calculated by Sir J. Herschel. If this be first ground to a truly spherical form, it must have a radius of 80 ft., as we have seen above. Now, such a mirror will give a very indistinct image, even under the most favorable circumstances; yet to grind it to the parabolic form, which is practically perfect, leaving the middle untouched, and grinding more and more away from its surface as we proceed outward to the edges, even at the edges we have to remove a film of metal of only the $\frac{1}{21333}$ part of an inch about the $\frac{1}{100}$ part of the thickness of the paper on which this is printed.

Lenses, whether the object-lens or the eye-lens, have this defect also; but, as a rule, the spherical aberration in lenses is almost negligible compared with *Chromatic Aberration*, which arises from the different refrangibilities (see REFRACTION) of the various colored rays; and leads to the formation, by a lens, of a separate image of a bright object for each colored ray. The remedy consists in *achromatizing* (see ACHROMATIC: REFRACTION) the lens—i.e., forming it of two or more lenses of different kinds of glass—so that the colors, separated by one, shall be reunited by the others. With a double achromatic lens, in which a convex lens of crown-glass is united to a concave of flint-glass, the focal lengths of the separate lenses can be easily adjusted so as to bring, when in combination, any two assigned rays of the Spectrum (q.v.) simultaneously to a focus; and, by judicious selection of these two rays, we may reduce the consequences of irrationality of dispersion (see REFRACTION) to a minimum. But this is not all. To construct a lens of a given material which shall have a given focal length, is an *indeterminate* problem; we may assign the curvature of either surface at pleasure, and then that of the other is definite, and can be calculated. Thus, the achromatism of a double-lens can be secured in an infinite variety of ways; and we may impose further conditions; i.e., that the curvatures of the convex and concave surfaces shall be adjusted so as to destroy as far as possible the spherical aberration. Other imperfections, such as those due to DIFFRACTION (q.v.), etc., can be here merely alluded to, as they do not admit of popular explanation within reasonable limits. Nor can we enter on questions connected with the correction of chromatic and spherical aberrations in eye-pieces, which is effected by combination of two or more lenses (generally of the *same* material) placed at a certain distance from each other. We note only that the defect (for terrestrial purposes) of the common astronomical telescope, the inversion of the image, is overcome by combining two such telescopes, the smaller to examine the image formed by the larger, and therefore to reinvert it. This practically comes to constructing the eye-piece of three lenses at a distance from each other; though, for greater distinctness, four are usually employed.

In the earliest, or Galilean, telescope, the eye-lens is concave; a construction now used only in opera-glasses. It

has far less chromatic and spherical aberration than the common astronomical telescope, and is shorter, since the distance between the lenses is the *difference*, not the *sum* of their focal lengths; but it has a very serious defect in the smallness of its field of view. This can be enlarged, as in opera-glasses, only by making the diameter of the object-lens disproportionately great.

Before the discovery of the possibility of forming an achromatic lens, Huyghens, Cassini, and others, had endeavored, by enormously increasing the focal length of the object-glass of the common astronomical telescope in proportion to its diameter, to get riddance as far as possible of chromatic aberration. This was called the *aërial* telescope, as the object and eye lenses were mounted separately on stands; the tube (which would have been 100, 200, or even 600 ft. long) being dispensed with. Valuable work was done with some of these telescopes, of 125 ft. focus; but the longer ones proved unmanageable. The principle involved in these constructions is, practically, the throwing the magnifying power more on the object-lens than on the eye-lens; as the image formed by the former was still so imperfect as not to bear much additional magnification; though achromatic eye-pieces could even then be made with one kind of glass. The great step required for shortening the unwieldy instrument was therefore the perfecting of the object-lens. We have seen how this was effected. Various very ingenious improvements on achromatic combinations, even yet (we incline to think) worthy the consideration of opticians, were devised by Dr. Blair. He obtained in solutions of mercury or antimony in hydrochloric acid, media, in which, while much more refractive and more dispersive than crown-glass, no irrationality of dispersion as compared with crown-glass could be detected. With these fluid lenses he was enabled to give the telescope an aperture of one-third of its focal length without a trace of residual color. The *dialytic* telescope, invented 1828 by Rodger, and since made by Plössl, promised well. Its object is to obtain a large aperture for the telescope with a flint-lens (the obtaining of which, in large and perfect disks, is the great difficulty) of moderate size. In this telescope the object-lens is single, and of crown-glass; having, of course, all the defects of the single lens. These are corrected, at some distance in the cone of converging rays, by interposition of a combination of a pair of much smaller lenses, whose focal lengths are equal for red rays; the first being a convex lens of crown, the second a concave of flint, glass. The adjustments of this instrument for exact correction are, a motion of the pair of lenses to or from the object-lens, to correct chromatic aberration; and a change of the distance between the two smaller lenses, to correct spherical aberration.

Chromatic being so much more serious than spherical aberration, it is not to be wondered at that the idea of substituting an object-mirror, in which the former is absent, for an object-lens, was early suggested. The first practicable scheme for the purpose seems to have been that

of Gregory; in which, however, two mirrors are employed. In the skilful hands of Short, this instrument completely superseded the ordinary astronomical telescope. Its chief defects are, the great loss of light by two direct reflections, and the increase of the spherical aberration by the fact that both mirrors are concave. The first defect is incurable, the second was partially overcome by Cassegrain's plan of using a small *convex* mirror for the second reflection. To Newton is due the simple idea of using the combination of a single curved mirror with a plane mirror and an eye-piece; a construction differing only in slight particulars from that now universally adopted for reflecting instruments. Newton constructed several such telescopes with his own hands, some of which are still preserved, e.g., one in the apartments of the Royal Soc. at Burlington House.

The elder Herschel constructed for himself all the instruments, gradually increasing in magnitude and optical power, by means of which he made his grand discoveries; and his son worthily succeeded him, both as constructor and as observer.

The gigantic telescopes of Lord Rosse and Mr. Lassell are wonderful examples of delicate art, and have had their full share, with the large achromatics of the present day, in the startling discoveries of modern astronomy.

The process of Liebig for depositing on glass an exceedingly thin film of silver, which, by careful polishing, can be rendered more highly reflective than any other material, was applied by Steinheil in the construction of large specula. This is an immense step, since any disk of glass will suffice, its optical properties not being employed; while, if it be once brought to a true parabolic figure, the silvering may be renewed as often as requisite. One of the great difficulties in the construction and working of large reflectors has hitherto been the casting and annealing of metallic masses of a few tons' weight: this, in the silvered specula, is entirely avoided. We cannot here enter into a description of the processes, often extremely ingenious, devised for the grinding, figuring, and polishing of lenses and specula.

For telescopes in the United States, see OBSERVATORY. The most successful telescopic lenses of large size have been by Lewis M. Rutherford of New York, for his own photographic work; and by the late Alvan Clark of Cambridge, Mass., for the great observatories—the making now continued by his sons.

The Yerkes Telescope.—The largest refracting telescope in the world was built by order of Charles T. Yerkes, a railroad magnate of Chicago, for the Yerkes Observatory founded by him at Lake Geneva, Wis., as part of the equipment of the Univ. of Chicago. The object-glass of this instrument is 40 in. in diameter, four inches larger than that of the T. in Lick Observatory (q.v.). The disks, ground by Alvan G. Clark & Sons, of Cambridgeport, Mass., were made by M. Mantois, of Paris. They were mounted by Warner & Swazey, of Cleveland, O. The telescopic tube,

made of steel in three sections, without the eyepiece, measures 62½ ft. The diameter of its largest end is 53 in. Its greatest thickness is in the middle section, which is ¼ of an inch thick; its total weight is 12,000 lbs. Nearly three years were spent in making the lens, whose focal length is 64 ft. and whose aperture is 41½ inches. The crown lens, which weighs 205 lbs., is 3 inches thick in the centre and 1¼ inches thick at the edge; the weight of the flint lens is 310 lbs., and the total weight, including the metal ring, is nearly 1,000 lbs. The crown and flint lenses are 7 inches apart. About $100,000 was paid for the lens, its glass plates alone costing nearly half this sum. The total length of the T. is 75 ft. The movable part of the instrument turns on the polar axis, which is a steel rod 13 inches long and 15 inches in diameter. The declination axis, which is of hardened steel, is 12 inches in diameter and weighs nearly 4,000 lbs. The entire apparatus is set within a dome, on a movable platform 70 ft. in diameter. This platform, which can be raised or lowered at will, has a range of elevation and depression of 22 ft. It is operated by hydraulic power, and has superseded the high observation-chair. The dome has a diameter of 90 ft., and is fitted with movable shutters which, alike with the dome, are worked by electricity. The clock by which the instrument is turned weighs 2,500 lbs., and is controlled magnetically. The supporting pier, resting on a foundation of solid masonry, is made in five sections, each 7 ft. high. The base section weighs 36,000 lbs., the others about 12,000 lbs. each. The distance from the base of the pier to the centre of motion is 43½ ft. When the object-glass of the telescope is pointed to the zenith it is 72 ft. above the base. The spectroscopic attachments of the instrument consist of a spectroheliograph, a stellar spectroscope, and a solar spectroscope. The principal mechanisms of the instrument are operated by electricity generated in a power-house some distance from the observatory, thus reducing the risk from fire. Owing to delay in construction the observatory was not opened till the summer of 1897.

TELESTIC, a. *tē-lĕs'tĭk* [Gr. *telestikos*, fit for finishing—from *telos*, the end]: relating to a purpose or an end.

TELESTICH, n. *tē-lĕs'tĭk* or *tĕl'ē-stĭk* [Gr. *telos*, the end; *stichos*, a line, a verse]: a poem in which the final letters of the lines make a word.

TELEUTOSPORES, n. plu. *tĕl-ū'tō-spōrz* [Gr. *teleu'tē*, an end, a conclusion; *spora*, seed]: long two-celled spores ending the vegetation of certain fungi, and beginning a new generation in spring.

TELFORD, *tĕl'fĕrd*, THOMAS: civil engineer: 1757, Aug. 9—1834, Sep. 2; b. in the valley of the Megget, Scotland; son of a shepherd, in Eskdale, Dumfriesshire. During the intervals of his attendance at school, young T. followed his father's occupation, diligently employing his leisure moments in perusal of whatever books were within his reach. At the age of 14 he was apprenticed to a stonemason; but found time to study Latin, French, and German, and for various reading. In 1780 he removed to

Edinburgh, where he studied architectural drawing; and 1783 he went to London, obtaining employment under Sir William Chambers, then engaged on his chief work, Somerset House. T.'s merits attracted his employer's notice, and he was appointed 1784 to superintend the erection (through three years) of the resident commissioner's house at Portsmouth dockyard—availing himself of the opportunity for mastering the details of construction of docks, wharf-walls, etc. In 1787 he was appointed surveyor of public works for Shropshire; and his many bridges gained for him the planning and superintendence of the projected Ellesmere Canal, 103 m. in length—a work which occupied him 1795–1805. In 1801 he received a commission from government to report on desirable public works for Scotland (see CALEDONIAN CANAL). In the same capacity he executed more than 1,000 m. of road in the Highlands, Lanarkshire, and Dumfriesshire (see ROAD-MAKING), and erected about 1,200 bridges, besides churches, manses, etc. In 1808, and again 1813, he was invited to Sweden; where he superintended the construction of the Gotha canal, for which he received a Swedish order of knighthood. His next great work was the construction of the road from London to Holyhead, including the erection of numerous bridges—among others, of the Menai *Suspension Bridge* (q.v.)—and the last was the execution of the St. Katharine's Docks in London. His other works—bridges, canals, tunnels, harbors—are too many to enumerate. For the last few years of his life, he retired from the active duties of his profession. He died at Westminster, and was buried in Westminster Abbey.—See *The Life of Thomas Telford, Civil Engineer, written by himself* (1838); Smiles's *Lives of the Engineers.*

TELIC, a. *tĕl'ĭk* [Gr. *telos*, the end]: denoting the final end or purpose.

TELL, v. *tĕl* [Icel. *tala*, speech: Dut. *tellen;* Dan. *tælle*, to count, narrate (see TALE)]: to express in words; utter; relate; reveal; betray; publish; explain; to give an account; count; number; to teach; to produce an effect, as 'every word *told.*' TELL'ING, imp.: ADJ. having or producing a marked effect, as a speech on an audience. TOLD, pt. pp. *tōld*, expressed in words; narrated. TELL'ER, n. *-ĕr*, one who tells (see also next entry). TELL-TALE, n. one who officiously gives information of another's private concerns; an instr. or contrivance for giving certain desired information, as the piece of lead, etc., hung outside an organ to show the exhaustion of the wind: ADJ. officiously and heedlessly revealing; babbling; telling tales. TO TELL OFF, to count and detail, as a number of men, for a particular duty. TO TELL OF, to inform about.—SYN. of 'tell': to disclose; divulge; reveal; discover; mention; communicate; impart; report; inform; acquaint; recite; rehearse; repeat; utter; express; relate; speak.

TELL, *tĕl:* district in the extreme n.w. of Africa, along the shores of the Mediterranean, comprising the corn-growing tracts extending s. from the Mediterranean to the

Atlas Mountains, and from w. to e. through Morocco, Algeria, and Tunis: see AFRICA: SAHARA.

TELL, WILLIAM: according to Swiss tradition long accepted, but recently shown to have only the slightest foundation, a patriot who, in the 14th c., rescued his native district from the tyranny of the House of Austria. His story has been variously told. According to the version most current, Hermann Gessler, bailiff (or *landvogt*) of Albert I. of Austria, lived at the castle of Küssnacht, 1307, and perpetrated on the people of the district atrocious cruelties. A league was formed of the principal men of the Walstädte, Uri, Schwyz, and Unterwalden, to resist the Austrian pretensions, and to it belonged Walter Fürst, and William Tell, his son-in-law. Gessler had placed the ducal hat of Austria on a long pole erected in the market-place of Altorf, and gave orders that no one should pass without uncovering his head. T. and his little boy one day took no notice of the hat, and were at once dragged before Gessler, who, hearing that T. had great reputation as a crossbowman, resolved to make his skill a means of punishing him. T. was ordered to shoot an apple from his son's head, and told that if he missed it, he should die: he shot, and hit the apple without injuring the child. Gessler, turning to T., asked him what he meant to have done with a second arrow he had in his girdle. 'To have shot you, if the arrow had slain my son,' was the reply. T. was then seized, bound, and thrown into a boat on the Lake of Lucerne, to be taken with Gessler and his men to the castle of Küssnacht. A sudden Alpine storm sprang up. T. was the only man on board who knew the shore, and could manage a boat in such weather. He was allowed to take the helm, and he soon ran the boat toward a rocky ledge; he there seized his bow and arrows, sprang on shore, and pushed the vessel back into the water. The storm, however, abated, and Gessler and his party landed. T. lay in wait for them in a rocky defile, and shot Gessler through the heart. This was followed by the great Swiss war with Austria—first of a series which lasted till 1499—in which, however, T. took no prominent part. T. was drowned, it is added, in 1350, in attempting to save a friend during a great flood of the river Schächen.

There is evidence that, 1387, a religious service was instituted to commemorate the act of T. at the place where he lived; and that, in the following year, Tell's Chapel was built on the spot where the boat was said to have landed. Russ and Etterlin, chroniclers near the end of the 15th c., told the story as history. Tschudi, in the first part of the 16th c., repeated it in the general form familiar to us and adopted by Schiller in his well-known drama. So early as the end of the 16th c., however, doubts were expressed of its authenticity. Guilmann, in his *De Rebus Helveticis*, questioned the very existence of Tell. What, he asks, has become of his family and relatives? Why was he not spoken of by his contemporaries? Grasser, author of a Swiss *Heldenbuch*, pointed out a striking resemblance between T. and Toke, hero of an old Scandina-

vian fable. From that period, incredulity became general, and several books were published to show that the story was merely legendary; and since the beginning of the 18th c. a library of literature on the subject has appeared in Switzerland, Germany, Denmark, and France. The most important works on the question are (1) Ideler's *Die Sage vom Schusse des Tell* (Berlin 1826), in which it is shown that the incident of the apple is purely legendary; (2) edition (1834) of Russ's Chronicle, by Schneller of Lucerne, in which it is proved that serious disparities exist between the versions of the story in the Swiss chroniclers; (3) a work (1835) containing documents relating to early Swiss history, by Kopp of Lucerne, in which it is satisfactorily shown that, though a continuous series of charters exist relative to the bailiffs of Küssnacht in the 14th c., there is no Gessler among them.—T. is nowhere mentioned in contemporary records; but it need not, therefore, be inferred that an obscure peasant of that name did not exist, who shot an Austrian bailiff on the banks of the Lake of Lucerne, and thus started a revolt. Such incidents, if real, might easily have become connected in tradition with the old fable of the tyrant, the bowman, and the apple, which appears in the legends also of Denmark, Iceland, Norway, Holstein, and England.—For the Tell controversy in full, see Hisely's *Recherches* (1843); and Vischer's *Die Sage von der Befreiung der Waldstädte* (1867).

TELLER, n. *tĕll'ĕr* [F. *taille*, a tally or piece of wood on which an account was kept by notches, which, when completed, was split in two with corresponding notches on each piece: Eng. *tallier*, formerly an officer in the Exchequer who paid and received money, and kept the checks or tallies (see TALLY)]: an officer in a banking establishment whose duty it is to receive and pay out money; one who numbers or reckons votes in a division in a deliberative assembly, as in parliament or the house of representatives. TEL'LERSHIP, n. the office of a teller.

TELLER, HENRY MOORE, LL.D.: lawyer and politician: 1830, May 23— ————; b. Granger, N. Y. He was educated at Alfred Univ., N. Y.; studied law, and was admitted to the bar at Binghamton, N. Y., 1859; removed to Ill., and thence to Colo. 1861; was elected republican U. S. senator on the admission of Colorado as a state 1876, and was re-elected for 1877–83; was chairman of a special committee on election frauds, known as the Teller committee, 1877–8; was U. S. sec. of the interior 1882–85; was re-elected U. S. senator 1885, 1891, 1897 and 1903. In 1896 he led the free-silver faction in their secession from the St. Louis national republican convention, after reviewing, in an intensely dramatic manner, his long career in the republican party.

TELLEZ, *tĕl-yĕth'*, GABRIEL: better known by his literary pseudonym *Tirso de Molina:* Spanish dramatist of great reputation: about 1570–1648; b. Madrid. He became a monk 1620, and 1645 became prior of a monastery of his order. T. was a friend and pupil of Lope de Vega, whom he almost rivalled in facility of execution. In the preface

to his *Cigarrales de Toledo* (1621), a collection of novels and comedies, he reckons the number of dramatic works composed by him at 300; but only 68 are extant. He wrote many other works. T. ranks next to Calderon and Lope de Vega as a dramatist. His plays are inartistic, but full of vitality. The delineation of character is piquant and vigorous; the wit abundant, and the language poetical.—The best ed. is that of Don Juan Eugenio Hartzenbusch, in *Teatro Escogido* (12 vols. Madrid 1839–42).

TELLICHERRY, *tĕl-ĭ-chĕr'rĭ:* seaport-town and milit. station of Brit. India, dist. of Malabar, 90 m. s.w. of Seringapatam. The site of the town is very beautiful, and the neighboring country highly productive, the low lands producing two, in some cases three, crops of rice in the year. The cocoa-nut tree grows in great abundance, and is put to many uses. For its salubrity, T. has been called the Montpellier of India. There is a natural breakwater abreast of the fort, formed by a reef of rocks parallel to the shore, having a depth within suitable for ships of 500 or 600 tons.—Pop. (1881) 26,410. (1891) 27,196.

TELLINIDÆ, *tĕl-lĭn'ĭ-dē:* family of lamellibranchiate mollusks; having the mantle widely open in front; foot tongue-shaped; siphons separate, long, and slender; shell usually equivalve and shutting close, hinge-toothed. The species are very numerous, and in almost all seas, mostly living in sand or sandy mud, some at considerable depth. The fossil species also are numerous, and are in the more recent formations. The genus *Donax* belongs to this family.

TELLURAL, a. *tĕl'ûr-ăl* [L. *tellus* (*tellur-*), earth]: of or relating to the earth.

TELLURATE, n. *tĕl'ûr-āt:* in *chem.*, a salt of telluric acid.

TELLURIAN, n. *tĕl-û-rī'an:* an inhabitant of the earth; a tellurion.

TELLURIC, a. *tĕl'ûr-ĭc:* of, pertaining to, or proceeding from the earth; in *chem.*, of, pertaining to, or containing tellurium, especially in its higher valence; as, *telluric acid* (H_2TeO_4).

TELLURID, or TELLURIDE, n. *tĕl'ûr-ĭd,* or *-rīde:* in *chem.*, compound of tellurium with an element or an organic radical. TELLURIFEROUS, a. *tĕl'û-rif'ĕr-ŭs* [from L. *tellurium* and *fero*, bear]: containing or yielding tellurium. TELLURITE, n. *tĕl'û-rīt:* in *mineralogy*, a subadamantine white or yellow tellurium dioxid (TeO_2), which crystallizes in the orthorhombic system; called also *telluric ochre.*

TELLURION, n. *tĕl-lū'rĭ-ŏn* [L. *tellus*, land, *tellūris*, of land]: a philosophical machine for showing how the causes operate which produce the succession of day and night, and the changes of the seasons.

TELLURIUM, n. *tĕl-lū'rĭ-ŭm* [L. *tellus*, land, *tellūris*, of land]: an elementary body, a rare metal, allied to selenium, of a brilliant tin-white color. TELLU'RIC, a. *-rĭk*, pert. to the earth, or procured from it; relating to tellu-

rium, or contained in it as a constituent. TELLU'RAL, a. *-răl*, pert. to the earth. TEL'LURATE, n. *tĕl'lū-rāt*, a salt of telluric acid. TEL'LURET'TED, a. *-rĕt'tĕd*, combined with tellurium. TELLURITE, n. *tĕl'lū-rīt*, a sort of ochre occurring in small white beads or spherical masses, having a tinge of grayish yellow. TEL'LUROUS, a. *-rŭs*, composed of one equivalent of tellurium and two of oxygen—applied to an acid.—*Tellurium* (symb. Te, at. wt. 128, sp. gr. 6·26) is a chemical element, which some authorities place among metals and others among the non-metallic bodies or metalloids. Although in outward characters it closely resembles the metals, its close analogies with sulphur and selenium indicate that its place is among metalloids. It has the lustre and color of silver; it fuses at about 850° F., and at a higher temperature is converted into a yellow vapor; it is a poor conductor of heat and electricity. When strongly heated in the air, it burns with blue flame, giving off white fumes of tellurous acid. Like sulphur and selenium, it is soluble in cold oil of vitriol, to which it gives a fine purple-red color, and on dilution it is precipitated unchanged; and in these respects differs from all metals. In nitric acid it dissolves with oxidation.

T. forms two compounds with oxygen, viz., *Tellurous oxide*, TeO_2, and *Telluric oxide*, TeO_3; and there are corresponding acids, viz., tellurous acid, H_2TeO_3, and telluric acid, H_2TeO_4. *Tellurous acid* is a hydroxide in which the acid and basic tendencies are nearly balanced —i.e., the T. of the compound can replace the hydrogen of an acid to form tellurous salts, and the hydrogen can be replaced by the basylous metals to form metallic tellurites. These salts have a metallic taste, and are said to act powerfully as emetics. Crystallized *Telluric acid*, $H_2TeO_4 + 2H_2O$, is freely soluble in water; it has a metallic taste, and reddens litmus paper. The crystals part with the water of crystallization at 212° F., and the remaining acid, H_2TeO_4, when strongly heated, gives off more water, and is reduced to anhydrous telluric oxide, TeO_3, which is insoluble in water or even in a boiling alkaline liquid. At the temperature of ignition telluric oxide loses oxygen, and is transformed into tellurous oxide ($TeO_3 - O = TeO_2$).—T. forms two sulphides, TeS_2 and TeS_3, analogous to the two oxides: the sulphides are obtained by action of hydrogen sulphide on solutions of tellurous and telluric acid, respectively.

The alkaline salts of T. have the power of forming, in the body of a healthy person, compounds which impart to the breath, to the perspiration, and to the gases generated in the intestinal canal a disgusting fetor, offensive to those whom he approaches; and this odor may last for weeks, though not more than a quarter of a grain of T. was administered.

T. is a rare substance, found chiefly in Transylvania; but is found also in N. America, in Hungary, and in the Altai silver mines. It occurs sometimes native, but usually as a telluride of gold, lead, or silver. For the method of extracting it, see works on chemical technology. It was discovered 1782 by Müller von Reichenstein, and its properties were accurately studied first by Klaproth 1798.

TELODYNAMIC, a. *tĕl'ō-dī-năm'ĭk* [Gr. *tēle*, afar, and *dunamis*, power]: of, related to, or used in the transmission of power to a distance.

TELONISM, n. *tĕl'ō-nizm* [from Gr. *telos*, end]: pseudonym formed from the final letters of a real name, as N.S., standing for John Anstis.

TELOTYPE, n. *tĕl'ō-tīp* [from Gr. *tēle*, afar, and *-type*, suffix]: printing telegraph, or a telegram printed by it.

TELPHER, a. *tĕl-fĕr* [Gr. *tēle*, afar; *pherein*, to carry]: pertaining to carriage by the special mode of electrical transport called *Telpherage*. TEL'PHERAGE, n. *-fĕr-āj*, electric transfer of goods in cars suspended from conductors that are supported by poles. An electric motor on the car or train of cars takes the current from the conductors: see ELECTRIC RAILWAY.

TELSON, n. *tĕl'sŏn* [Gr. *telson*, a form of *telos*, a limit]: the last joint in the abdomen of crustacea; the tail-piece.

TEMBU, *tĕm-bŏ'* (*Abatembu'*, or *Tamboo'kie*): tribe of about 90,000 Kafirs, in the region e. of the original boundary of the Cape Colony, where it forms the e. limit of the dist. of Queenstown; now under British authority.

TEMERITY, n. *tĕ-mĕr'ĭ-tĭ* [F. *témérité*—from L. *temerĭtas* or *temerĭtātem*, rashness—from *temĕrĕ*, rashly: It. *temerità*]: unreasonable contempt of danger; rashness; foolhardiness.—SYN. of 'temerity': hastiness; recklessness; venturesomeness.

TEMESVAR, *tĕm-ĕsh-vâr'*: Hungarian city, chief town in s.e. Hungary, the strongly fortified seat of the commander of the Banatish-Servian milit. frontier; on the Bega canal, about 300 m. s.e. of Vienna, with which it is connected by railway. Of the population about half are German, a seventh Magyar, and the rest Roumanians, Jews, and Servians. In T. are a fine cathedral, an ancient castle, a magnificent episcopal residence, an armory, barracks, and a theatre. T. is a neat and pleasant town, a favorite place for residence. There are manufactures of cloth, silk, paper, and oil; and brisk transit trade in grain, wax, honey, and brandy, with Transylvania, Servia, and Roumania. T. has endured many sieges—the latest 1849, when it was bombarded 107 days by the Hungarian insurgents, until relieved by Marshal Haynau. Pop. (1869) 32,223; (1880) 33,694; (1890) 39,850; (1900) 53,033.

TEMPÉ, *tem'pā*, VALE OF: narrow valley or glen, about 4½ m. long, in n.e. Thessaly, between Olympus (q.v.) and Ossa (q.v.), through which flows the river Peneus. The classic poets (none of whom seem to have seen the glen) praise it for its matchless beauty; hence the name became a synonym for any lovely sequestered vale. In fact, however, the scenery is characterized by wild grandeur rather than by soft sylvan charms. TEMPEAN, *tĕm-pē'ăn*, a. of, or pertaining to, or resembling.

TEMPER, v. *tĕm'pĕr* [F. *tempérer*, to qualify, to temper—from L. *temperārĕ*, to mingle in due proportion, to qualify—from *tempus*, time, fit season: It. *temperare*]: to mix so that one part qualifies the other; to qualify; to make

fit; to unite in due proportion; to beat together to a proper consistence; to form to a proper degree of hardness, as metals; to soften; to mollify; in *OE.*, to accommodate; to modify; to govern: N. a mixture of different qualities in due proportion; the state of a substance made up from the mixture of various ingredients; the state or constitution of the mind; disposition of mind, good or bad; mood; irritation; the state of a metal, especially as to its hardness. TEM'PERING, imp.: N. preparing of steel or iron to render it more compact, hard, and firm, or more soft and pliant (see STEEL): ADJ. mixing and qualifying; softening; hardening. TEM'PERED, pp. *-pĕrd*, hardened: ADJ. disposed, as in GOOD-TEMPERED, a. well-disposed; not irritable or passionate; the opposite of BAD-TEMPERED. TEM'PERED-LY, ad. *-lĭ*. TEM'PERAMENT, n. *-pĕr-ă-mĕnt*, natural organization or constitution; due mixture of different qualities; the peculiar physical and mental character of an individual (see below): in *music*, a system of compromises in the tuning of organs, pianofortes, and the like (see below). TEM'PERANCE, n. *-ăns* [F. *tempérance*—L.]: habitual moderation in indulgence of the natural appetites and passions; sobriety; calmness; sedateness; in *OE.*, temperature. *Note.*—In *common usage*, TEMPERANCE has become synonymous with abstinence from alcoholic liquors (see below: also TOTAL ABSTINENCE).—SYN. of 'temper, v.': to compound; mingle; mollify; soothe; calm; assuage; soften;—of 'temper, n.': mind; disposition; character; frame; humor; mood; irritation.

TEMPERA, n. *tĕm'pĕr-ă* [It.]: a kind of painting in which the pigments are mixed with chalk or clay, and diluted with weak glue or size, used chiefly in scene-painting and the decoration of rooms; called also *Distemper* (q.v.).

TEM'PERAMENT, in Music: system of compromise in keyed instruments for avoiding the necessity, presupposed by the strict relation of musical intervals, of having a separate row of keys corresponding to each tonic. Taking C as key-note, the ratios of the notes of the diatonic scale, as derived from the number of vibrations in a given time of a string sounding that note (see MUSIC), are:

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48

The intervals between these notes are not equal, and may be thus expressed in numbers by logarithms:

C	D	E	F	G	A	B	C
51	46	28	51	46	51	28	

We have here three species of intervals, of which those represented by 51 are called major tones; those by 46, minor tones; and the smaller intervals represented by 28, semitones. These intervals will evidently serve only with C as key-note. If, e.g., we start from D instead of C, we find E a tolerable, though not quite correct, second to D; but the third and seventh of the scale are entirely wrong. Were

the major and minor tones equal, and each semitone exactly half a tone, the insertion of a note in the middle of each tone dividing the seven intervals would make it indifferent where the scale began, any one of the 12 notes becoming alike available as a key-note; and though such equality is contrary to the immutable principles of harmony, an arrangement based on it is found practically to give but little offense to the ear. In what is called the *equal temperament*, the 12 intervals all are of the same length, and no advantage is given to one key over the rest. This is, in theory at least, the T. adopted in the pianoforte. Another system, known as *Smith's* or the *vulgar temperament*, in which some keys were favored at the expense of others, has been much used in organs in some countries. While the keys of B♭, F, C, G, D, and A are more perfect than on equally tempered instruments, E♭, A♭, D♭, and F♯ contain some very harsh intervals. The bad fifths and thirds which exist in these keys are designated by musicians as *Wolf* intervals. This mode of tuning the organ is being abandoned for the equal T., or an approximation to it. The different characters of the various keys often observed on the piano-forte and the organ could have no existence were the T. absolutely equal; and they arise from the fact that this strict equality is not altogether adhered to in practice.

TEM'PERAMENT, in Physiology: the particular physical and mental characteristics presented by different individuals. Some writers, following Cullen, divide human temperaments into two main classes—the *sanguineous* and the *melancholic;* classing the *phlegmatic* as a degree or modification of the sanguineous, and the *choleric* of the melancholic. Many writers recognize also a *nervous* T., in which the predominating characteristic is great excitability of the nervous system, and undue predominance of the emotional impulses: this T. is always associated with the sanguineous or the melancholic.

Individuals of the *sanguineous* or *sanguine* temperament are, according to Cullen, such as have the quantity of fluids in the body large in proportion to the solids; habit of body soft and plump; skin smooth, white, and readily sweating on exercise; hair soft, and generally pale, passing thence to a red tint; complexion ruddy; eyes blue; bodily strength moderate; and the mind sensitive, irritable, cheerful, and unsteady. In persons of *melancholic* temperament, the habit of the body is somewhat hard and meagre; skin and complexion coarse, and of dun color; hair hard, curly, and black; strength considerable; the mind slow, disposed to gravity, caution, and timidity, but tenacious and steady.

In both sexes, the characteristics of the temperaments are far less manifest in old age than in earlier life. The different temperaments in many cases merge so gradually into one another that it is difficult to assign to its distinct T. a special case.

TEMPERANCE MOVEMENT, The: in its broader meaning, a movement to diminish the evils of intemperance, whether by efforts directed toward the personal habits of the drinker, or toward the barter and sale by the dealer. More strictly, the T. M. applies to only the former class of efforts, which depend on education and persuasion rather than legal enactments. It is with the educational and moral aspects that this article deals. (For legal aspects, see License: Local Option: Prohibition.)

History.—The origin of the modern T. M. is generally attributed to Dr. Benjamin Rush, of Philadelphia (1745–1813), one of the signers of the Declaration of Independence, prof. of chemistry in the Philadelphia Med. Coll., eminent practitioner, and prominent philanthropist. He published 1785–87 a series of articles on *The Effect of Ardent Spirits on the Human Body and Mind*, printed in pamphlet form 1794, and widely read. In this pamphlet he dwelt on the evil effects of distilled liquors, and urged abstinence from them, from moral as well as physiological considerations. Previously to this, the Society of Friends, of which Dr. Rush was a member, had (1784) placed in their discipline a clause against the use of ardent spirits; and prior even to this (1744) it appears that John Wesley had inserted among the Rules of the early Methodists a rule prohibiting 'drunkenness, buying or selling spirituous liquors, or drinking them unless in cases of extreme necessity.' (Dorchester's *Liquor Problem in All Ages*, 164.) The first temperance society to attain anything more than local and temporary existence was organized in Boston 1813, Feb. 5. Till that date the question had been obtaining wider and wider attention, culminating in the Rev. Dr. Lyman Beecher's report adopted by the General Assoc. of Congl. Churches of Conn., 1812, May, recommending parents to exclude ardent spirits from their families, and church members to refrain from buying, selling, or using them. Chiefly to Dr. Beecher's energy and eloquence was due the formation of the soc. in Boston, which began with Hon. Samuel Dexter, ex-sec. of war and of the treasury, as its pres., and an array of many other distinguished names in its list of officers. Its title was, The Massachusetts Soc. for the Suppression of Intemperance, and its object was 'to discountenance and suppress the too free use of ardent spirits, and its kindred vices, profaneness and gaming, and to encourage and promote temperance and general morality.' It was, therefore, what would be now characterized as a 'moderation society.' The first work of the society was in gathering facts and statistics from all possible sources, and in spreading these by the printed page and in public addresses and sermons. The use of liquor was at this time almost universal; and total abstinence, even from ardent spirits, was counted as a mark of eccentricity. It was customary to supply spirituous liquor at christenings and funerals, and even church conferences. The preacher in his pastoral visits partook of it, and it constituted an important feature of all social and public occasions. Against this custom the new 'moderation' movement strove vig-

orously and intelligently, making a decided impression on public sentiment, but failing to check the tide of intemperance. The movement spread into other states, especially the New England states; but at the end of ten years it was generally pronounced a 'failure,' and the amount of liquor consumed seems to have increased far beyond the increase in population.

About this time (1825), Dr. Lyman Beecher again came to the front with a series of *Six Sermons on Intemperance*, in which he demanded 'the banishment of ardent spirits from the list of lawful articles of commerce.' It was a far more radical step than had been taken heretofore, though even yet the relation of fermented liquors to intemperance was not adequately discerned. The Rev. Dr. Justin Edwards and John Ware, M.D., in the same year came out as advocates of the same principle—total abstinence from distilled liquors. 1826, Feb. 13, the American Soc. for the Promotion of Temperance was organized in Boston, with Hon. Marcus Morton as pres. Its influence became at once widespread, and in two years 222 societies in 17 different states had been formed on the same basis. In 1836 the number had increased to 7,000 societies, with membership given in round numbers as 1,250,000.

The movement had meantime spread into other countries. In 1829 a similar soc. was formed in Belfast, Ireland, by Prof. John Edgar, and one in Glasgow, Scotland, by John Dunlop; one in Bradford, England, 1830, by Henry Forbes; one in Stockholm, Sweden, and one in Norway, 1837; and several in Berlin, Germany, 1837. In all these countries the impulse was permanent, and took about the same course of development, into total abstinence, as in the United States.

In 1833 a national convention was held in Philadelphia, and a National Temperance Union was formed. As yet, total abstinence from *distilled liquors* was as far as these organizations as a rule thought advisable to go. But the necessity was becoming more and more apparent for a step farther in advance, and 1836 a national temperance convention at Saratoga Springs placed itself on the basis of 'total abstinence from all intoxicating liquor,' this being fully understood to include wines, beer, ale, and cider. This step may be said to have inaugurated fully the Total Abstinence movement, which a few years later burst forth in America into the Washingtonian movement, and in Ireland into the Father Mathew movement, and later still into the sweeping triumphs of prohibition by law in many of the American states. (See TOTAL ABSTINENCE; PROHIBITION). The total-abstinence movement has since that period absorbed nearly all the efforts distinctively in behalf of temperance, the exceptions being the Church of England Temperance Soc. and the Wesleyan Soc. (also of England), and the Church Temperance Soc. of America. These organizations rest on the 'dual basis'—those who 'use temperately' and those who 'abstain entirely' from intoxicating drinks being entitled to membership on an equal basis.

Methods.—The T. M. until the period of the Washing-

tonian movement (1842–44) was limited for the most part to prevention of drunkenness, and attempted but little in reclaiming drunkards. The public pledge, verbal frequently at first, afterward written, has been one of the most common agencies. The appeal to law, for co-operation, was from the beginning urgent and continuous. This appeal was at first for restrictive acts, lessening the number of tippling-houses, increasing the prices, fixing penalties on drunkenness, forbidding the use of liquor on state occasions, striking it out of the army and navy rations, and prohibiting its sale in small quantities at a time. The educational work was carried on very largely through the churches and Sunday schools, efforts being made to commit churches to two points—(1) forbidding members to drink to excess, on penalty of expulsion; (2) forbidding local ministers and officers of the church from engaging in the traffic in liquors. Another line of effort was to induce employers and public men to set temperate examples to the community, and to induce the former class to stop furnishing an allowance of liquor to their workmen. Efforts were made also, with some success, to secure and spread knowledge of the physiological effects of alcohol, though on this point science was not yet adequately equipped to respond with much confidence. As fast as public sentiment was created, it was sought to crystallize it in associations for the work of propagation.

See TOTAL ABSTINENCE: TEETOTALISM: PROHIBITION: LOCAL OPTION: LICENSE: TEMPERANCE UNION, NATIONAL WOMAN'S CHRISTIAN: also INTOXICATION: DIPSOMANIA: DELIRIUM TREMENS: DELIRIUM EBRIOSUM: DELIRIUM NERVOSUM: ALCOHOL: FERMENTATION: DISTILLATION: FOOD AND DRINK.

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TEMPERANCE UNION, NATIONAL WOMAN'S CHRISTIAN, THE: association for the abolition of the liquor traffic, the protection of the home, and the triumph of Christ's golden rule in custom, society, and law. The organization was the outgrowth of the Woman's Crusade, a movement which began in Hillsboro, O., 1873, Dec., and spread over a large part of the U. S., in which Christian women met for prayer in the churches, and then marched in procession to the liquor saloons—praying in the saloon, or before its door if not permitted to enter, and pleading with the saloon-keepers to give up the business. This movement in 50 days closed the saloons in 250 towns and villages. In 1874, Aug., at Chautauqua, N. Y., a call for a permanent organization of temperance women was issued, and in a meeting at Cleveland, O., Nov. 18–20 of that year, the Woman's Christian Temperance Union of the United States was formed, the first pres. being Mrs. Wit-

tenmeyer, of Philadelphia, and the first cor. sec. Miss Frances E. Willard, of Chicago. It was incorporated 1883, Mar. 1, in Washington, D. C. In its subdivisions the union follows the political divisions of the nation, having state, territorial, county, and town organizations. It now has an organization for every state and territory (except Alaska) and for the District of Columbia, with the addition that for local convenience Cal. and Wash. have each been divided into 2 unions. The total membership (1897) was estimated at 200,000. The conditions of membership are the signing of the pledge and the payment of the annual membership dues (usually 50 cents). The pledge is as follows: 'I hereby solemnly promise, God helping me, to abstain from all distilled, fermented, and malt liquors, including wine, beer, and cider, as a beverage, and to employ all proper means to discourage the use of and traffic in the same.' The badge, a knot of white ribbon, was adopted in the convention of 1877. At noon of every day each white-ribboner, the world over, is expected to lift her heart to God in prayer for His blessing on the work and workers and for the overthrow of the liquor system and its allies.

The work of the soc. is divided among 40 depts., of which the chief are as follows. organization; young women's branch; loyal temperance legion branch (for children); work among foreigners; work among colored people; health and heredity; non-alcoholic medication; scientific temperance instruction; physical culture; Sunday-school work; temperance literature; temperance and labor; W. C. T. U. schools; the press; narcotics; school savings-banks; kindergarten; medal contest work (by recitations, dialogues, songs, etc.); unfermented wine at the communion-table; proportionate and systematic giving; penal and reformatory work, including police-station work; work in almshouses; securing homes for homeless children; work among railroad employees; work among soldiers and sailors; work among lumbermen; work among miners; Sabbath observance; mercy department (for all living creatures); purity department; purity in literature and art; parlor meetings; flower mission; state and county fairs; legislation and enforcement of law; franchise; peace and international arbitration; Christian citizenship (for study of the science of government, conduct of elections, etc.). Mothers' meetings are given great importance, though not ranking as a distinct dept.

Each of these depts. has its own national and state secretaries, who give special attention each to her own special line of work, thus securing remarkable efficiency. The dept. for scientific temperance instruction, under the able leadership of Mrs. Mary H. Hunt, has secured laws requiring such instruction in all but three of the states, and national laws requiring it in all the territories and the Dist. of Columbia.

Affiliated interests of the National W. C. T. U. are the Woman's Temperance Publishing Assoc., owned and controlled entirely by women, publishing the official organ

of the W. C. T. U.; the *Union Signal*, and a great variety of temperance literature; the National Temperance Hospital, practicing non-alcoholic medication with remarkable success; and the Temple, a fine building in Chicago, in which the offices of the Union now are, and which is intended to be the permanent home and property of the society.

The World's W. C. T. U., including the white-ribbon unions of all nations, was organized 1883, and now includes 40 nations, with a membership of 500,000. Frances E. Willard is pres., Lady Henry Somerset vice-pres., Agnes E. Slack sec. Its polyglot petition addressed to all the governments of the world for the abolition of the manufacture of and traffic in alcoholic liquors and opium, and against the legalization of impurity, has already been presented to the pres. of the U. S. and to Queen Victoria, and will be presented in due course to all governments of the world. The Union now has missionaries in almost all lands.

TEMPERATE, a. *tĕm'pĕr-āt* [L. *temperātus*, pp. of *temperārĕ*, to mingle in due proportion, to qualify (see TEMPER)]: moderate; not excessive; habitually moderate in the indulgence of the appetites and passions; sober; moderate or intermediate; measured; calm; free from passion or undue excitement. TEM'PERATELY, ad. *-lĭ*, moderately; not in excess. TEM'PERATENESS, n. *-nĕs*, moderation; freedom from excess; calmness. TEM'PERATURE, n. *-ă-tūr* [F. *température*—L.]: degree of heat or cold; any degree of sensible heat as measured by the thermometer (specifically, see TERRESTRIAL TEMPERATURE); in *OE.*, moderation. MEAN TEMPERATURE, the mean of all the temperatures observed at any place at regular intervals during a certain time. TEMPERATE ZONES, two parts of the earth n. and s. of the equator, within which the sun never appears vertical—the *north* temperate zone lying between the Arctic circle and the tropic of Cancer, and the *south* between the Antarctic circle and the tropic of Capricorn.—SYN. of 'temperate' abstinent; abstemious; sober; moderate; calm; sedate; self-restrained; cool.

TEM'PERATURE OF THE BODY: important indication in medical practice. Though the range of T. varies in different parts of the human body, the normal T. at completely sheltered parts of the surface amounts to 98·4, or a few tenths more or less in temperate climates; and if there is persistent elevation above 99°·5, or depression below 97°·3, some form of disease is certainly indicated. (In warm-blooded animals, generally, the T. is one degree lower at completely sheltered parts of the surface than in the back of the mouth, or other accessible internal parts.)

For some of the circumstances which cause a deviation from the normal T., see ANIMAL HEAT. It is further to be noted that exposure to cold without exercise, and sustained mental exertion, reduce the T.: and that the amount of heat is at first reduced after a full meal, though it subsequently rises. Moreover in the tropics the average T. is nearly 1° higher than in temperate regions.

When the T. rises in disease, the following relation to its augmentation and that of the pulse has been established;

an increase of 1° above 98° corresponds with an increase of ten beats of the pulse in a minute. Thus, if the pulse is 60 at 98°, it is 70 at 99°, 80 at 100°, and so on. It is now established that the preternatural heat which in certain cases can be detected by the thermometer, and may exist to the extent of 4°, 6°, or even 8° above the average in health, and which varies in amount in different diseases, in different persons, and at different times of the same day, is the essential symptom of fever. Accidental discovery of a T. 6° above the normal has led to detection of tubercular disease of the lungs and intestines. Wunderlich, whose experience embraces at least half-a-million exact thermometric observations, bears unqualified testimony to the value of this mode of investigation in early detection of disease, and as furnishing an important guide to treatment.

A few of the more important of these observations are here given in condensed form. In *ague*, the T. begins to rise several hours before the beginning of the paroxysm; and after the disease *seems* to have disappeared, a periodic increase of the T. may still be detected; and as long as this continues, the patient is not really cured. In *typhoid fever*, the rise of T., or its abnormal fall, will indicate what is about to happen three or even four days before any change in the pulse or other sign of mischief has been observed. A sudden fall of T. has thus denoted intestinal hemorrhage several days before it appeared in the stools. A fall as low as 93° was noticed by Parkes in a case of this kind. When a person, healthy on the previous day, exhibits in the morning a T. above 104°, it is almost certain that an attack of ephemeral fever or ague is coming on; and should the T. rise to or beyond 106°·3, the case will certainly turn out one of ague or of some other form of malarious fever. If, during the first day of illness, the T. rises to 106°, it is certain that the patient has not typhus or typhoid fever; and if the T. of a patient, who exhibits the general signs of pneumonia, never reaches 101°·7, it is certain that there is no soft infiltration in the lungs. In typhoid fever, a T. not exceeding on any evening 103°·5, indicates a probably mild course of fever. A T. of 105° in the evening, or 104° in the morning, shows a severe attack, and forebodes danger during the third week. On the other hand, a T. of 101°·7, and below, in the morning, indicates a very mild attack, or the beginning of convalescence. In pneumonia a T. of 104° and upward indicates a severe attack. In acute rheumatism, a T. of 104° is always an alarming symptom. In a case of jaundice otherwise mild, an increase of T. indicates a pernicious turn. In tuberculosis an increase shows advance of the disease, with untoward complications. In short, a fever T. of 104° to 105° in any disease indicates that its progress is not checked, and that complications may still occur. Persistent elevation of T. exists as an invariable precursor of the growth of tubercle in any organ. As a general rule, when the T. rises continuously to 106°·2, the prognosis is unfavorable; and when it rises to 110°, a fatal issue is almost certain.

The diseases in which the highest T. have been observed are scarlatina, in which it has been noted at 112°; and tetanus, in which, at the period of death, it was 112°·5, and an hour afterward 113°·8. In Dr. Aitken's *Science and Practice of Medicine* diagrams are given illustrating the range of T. in ague, erysipelas, measles, pneumonia, simple continued fever, scarlatina, small-pox, typhoid and typhus fevers, etc.; with description of the instruments for ascertaining the T., the method of using them, and rules for recording observations.

TEMPEST, n. *tĕm'pĕst* [OF. *tempeste;* F. *tempête*, a tempest—from L. *tempes'tas*, weather, a storm—from *tempus*, time: It. *tempesta*]: wind rushing with great velocity and violence, with or without rain, hail, or snow; a storm of extreme violence; any violent agitation or commotion, as of passion or party-war; tumult; perturbation: V. in *OE.*, to disturb greatly or violently, as by a tempest; to storm. TEM'PESTING, imp. TEM'PESTED, pp. TEMPESTUOUS, a. *tĕm·pĕst'ū-ŭs*, very stormy; turbulent. TEMPEST'UOUSLY, ad. *-lĭ*. TEMPEST'UOUSNESS, n. *-nĕs*, the state or quality of being tempestuous. TEMPEST-BEATEN, a. exposed to the full violence of the tempest. TEMPEST-TOST, or TEMPEST-TOSSED, driven about by storms.—SYN. of 'tempest, n.': storm; hurricane; tornado; cyclone; agitation; purturbation.

TEMPLAR, n. *tĕm'plĕr:* one of a military order of religious persons established in the 12th c. (see TEMPLARS KNIGHTS): in modern usage, a student of law of the *Temple* (q.v.), in London.

TEMPLARS, *tĕm'plĕrz*, KNIGHTS: a religious and military order, founded at Jerusalem in the beginning of the 12th c., by Hugues de Paganes, Geoffroy de St. Omer, and seven other French knights, for the protection of the Holy Sepulchre, and of pilgrims resorting thither. Baldwin II., King of Jerusalem, bestowed on this order their first place of residence; and an additional building was acquired from the abbot and canons of the church and convent of the Temple, whence the order obtained the name 'Poor Soldiers of the Temple of Solomon,' afterward abbreviated into Templars. The knights were bound by their rule to hear the holy office every day, or if prevented by their military duties, to say a certain number of paternosters instead; they were to abstain from flesh four days in the week, and from eggs and milk on Fridays. They might have three horses and an esquire each, but were forbidden to hunt or fowl. In their earlier history, the T. made a great show of poverty, contrasting much with their later condition. After the conquest of Jerusalem by the Saracens, they spread over Europe; their valor became everywhere celebrated; immense donations in money and land were showered on them; and members of the most distinguished families thought themselves honored by enrolment in the order. In every country where they existed, they had their governor, called the Master of the Temple or of the Militia of the Temple. The Templars had settlements in England from an early period. The first was in London, on the site of Southampton Buildings, Holborn;

but from 1185 their principal seat was in Fleet Street, still known as the Temple, but now occupied by lawyers, and owned by the two Inns of Court (see TEMPLE: INNS OF COURT). The round church in London, which bears their name, was dedicated by Heraclius, Patriarch of the Church of the Resurrection in Jerusalem, 1185, and the chancel was consecrated 1240.

The T. were all at first laymen and of noble birth. Pope Alexander III., however, 1162, authorized the admission of spiritual persons not bound by previous vows, as chaplains to the order, who were not required to adopt the military vows. A third class was afterward introduced, consisting of laymen not of noble birth, who entered as serving brothers, some being attendants on the knights, others exercising trades in the houses or lands of the order. Eventually, many persons became affiliated members without taking the vows, for the protection afforded them. As the power and prosperity of the T. increased, so did their luxury and arrogance; which gave the French kings a pretext for suppressing them, and seizing their possessions. Accusations, most of which were utterly absurd and incredible, were brought against them by two members of their own body. Their principal enemy was Philippe IV. of France, who induced Pope Clement V. to accede to a scheme by which the chief members of the order were seized and imprisoned, their lands confiscated, and many of them tried and summarily put to death, on charges for which there was no evidence beyond the confessions of a few, wrung from them by the severest tortures. See MOLAY, JACQUES DE. The English T. were arrested by command of Edward II.; and a council in London, 1309, having convicted them of various crimes, most of which were probably imaginary, the king seized their possessions. In 1312 the whole order throughout Europe was suppressed by the Council of Vienne, and its property bestowed on the Knights of St. John, to whom their English possessions were formally transferred 1323.

The habit of the Templars was white, with a red cross of eight points of the Maltese form worn on the left shoulder. Their war-cry was 'Beau séant;' and their banner, which bore the same name, was parted per fess sable and argent. They also displayed above their lances a white banner charged with the cross of the order. Their badges were the *Agnus Dei*, and a representation of two knights mounted on one horse.—See Addison's *History of the Knights Templars, the Temple Church, and the Temple* (Lond. 1842); A. O. Haye's *Persecution of the Knights Templars* (Edin. 1865).

TEMPLATE, n. *tĕm'plāt*, or TEM'PLET, n. *-plĕt* [L. *templum*, a piece of timber, a purline lying horizontally on the rafters—from Gr. *temnō*, I cut]: pattern used by masons and bricklayers as a guide for the formation of ornamental portions of their work, and generally consisting of sections of moldings, etc., cut in thin board; pattern used by machinists, mill-wrights, etc., for shaping the teeth of wheels and other parts; short piece of timber under a beam or girder to distribute the pressure.

TEMPLE, n. *tĕm'pl* [F. *temple*—from L. *templum*, a portion cut off, an open sacred place, a temple: allied to Gr. *temĕnos*, a sacred inclosure—from *temnō*, I cut]: a building appropriated to religious rites and worship; a church. THE TEMPLE, in *London*, a district comprising buildings—formerly the property of the Knights Templars—occupied by lawyers, the joint property of the two Inns of Court called the Societies of the Inner Temple and Middle Temple, each of which has a right of calling persons to the degree of barrister—a privilege shared by the two other Inns of Court, Gray's Inn (q.v.), and Lincoln's Inn (q.v.). See TEMPLARS, KNIGHTS: INNS OF COURT. THE TEMPLE, *especially*, the temple of Solomon.

TEMPLE, n. *tĕm'pl*, usually in the plu. TEM'PLES, *-plz* [OF. *temple;* F. *tempe;* It. *tempia*, the temple of the head—from L. *tempŏra*, the temples of the head]: the upper part of the sides of the head. TEM'PORAL, a. *-pō-răl*, belonging to the temples. TEMPORAL BONES: see SKULL.

TEMPLE, *tĕm'pl:* city in Bell co., Tex.; on the Gulf Colorado and Santa Fé and the Missouri Kansas and Texas railroads; 36 m. s.-by-w. of Waco, 218 m. n.w. of Galveston. It is in an agricultural and stock-raising region; has 3 nat'l banks (cap. $250,000), 1 daily and 3 weekly newspapers, and school property valued at $11,275, and (1890) had receipts $12,467, disbursements $8,480, debt $33,957, and assessed valuation $1,201,984.—Pop. (1900) 7,065.

TEM'PLE, FREDERICK, D.D.: archbishop of Canterbury, Eng.: b. Santa Maura, 1821, Nov. 30. He graduated B.A. at Oxford 1842, taking high rank, after which he was fellow and math. tutor in his college, Balliol. In 1846 he was ordained deacon; and was principal of Kneller Hall Training School 1848–55, inspector of schools 1855–58, head master of Rugby School 1858–69, and queen's chaplain. His contribution ('The Education of the World') to the famous volume *Essays and Reviews* occasioned unavailing opposition to his consecration as bp. of Exeter, to which he was nominated by Gladstone 1869. In 1885 he was appointed bp. of London. He was author of three published series of Rugby sermons 1859–69, and *Relations between Religion and Science* (Bampton Lectures 1884). On the death of Abp. Benson, 1896, Oct. 11, Lord Salisbury selected T. as his successor as abp. of Canterbury; T. being then nearly 75 years of age, but a man of unlimited willingness to work, with a genius for business details, and with a wonderful record as an organizer and administrator. He was a liberal in politics and in former years a broad churchman. He died 1902, Dec. 23.

TEM'PLE, RICHARD GRENVILLE, Earl: 1711, Sep. 26—1779, Sep. 11; b. England: brother of George Grenville. He was elected to parliament 1734; succeeded to the earldom 1752; was lord of the admiralty 1756–7, lord privy seal 1757–61; and was made knight of the Garter 1760. William Pitt married his sister Hester, and the correspondence of the Grenville brothers with that statesman was published under the title of *The Grenville Papers*, 4 vols. (1852–3).

TEMPLE, Sir WILLIAM: English diplomatist and writer: 1628–1699, Jan. 27; b. London; eldest son of Sir John T., master of the rolls in Ireland. He studied two years at Emmanuel College, Cambridge, and at the age of 19 travelled abroad. He acquired the French and Spanish languages. He entered on public life 1661 as member for the county of Carlow, in the Irish parliament. In 1665, he was sent to Westphalia, on a secret mission; and on his return was created a baronet, and appointed resident at the court of Brussels. The chief aim of this accomplished statesman was to enjoy lettered ease and leisure, apart from public responsibility. He was naturally, however, a good negotiator. His most important diplomatic success was the famous treaty of 1668, known as the Triple Alliance, by which England, Holland, and Sweden bound themselves to unite in curbing the ambition of France. He was long ambassador at the Hague, and assisted in bringing about the marriage of the Prince of Orange with the Princess Mary. Charles II. in vain urged him to accept the appointment of sec. of state. When the revolution placed William III. on the throne, T. was again solicited to become sec. of state; but he again refused. During the remaining ten years of his life, mostly at his favorite seat of Moor Park, in Surrey, he had, as secretary and humble companion, Jonathan Swift (q.v.), who regarded his stately, studious, and self-complacent patron with more fear than affection, but who ultimately became his literary executor. T.'s collected works form four vols. (Lond. 1814).

As an author, T. is now known chiefly by his historical *Memoirs* and his *Miscellanea*, the latter a collection of essays on various subjects. He has been considered one of the reformers of English style, 'the first writer,' says Johnson, 'who gave cadence to English prose.' His style has quite a modern air, and is smooth, copious, and agreeable. He is too pretentious as respects scholarship and learning, and has no weight as a political writer; but he expatiates pleasantly on foreign travel and country life, on flowers and fruits, on parterres, terrace-walks, and fountains.—As a public servant T. was impartial, honest, unambitious, and in his foreign policy admirable.

TEMPLEMORE, *tĕm-pl-mōr':* market-town of the county of Tipperary, province of Munster, Ireland; supposed to take its name from a commandery of the Knights Templars; 79 m. from Dublin on the right bank of the river Suir, 9 m. n. of Thurles. Pop. about 2,800.

TEMPLET, *tĕm'plĕt:* see TEMPLATE.

TEMPLIN-OIL, n. *tĕm'plĭn-* [etym. doubt.]: in *chem.*, oil of pine-cones; obtained by distilling the cones of the silver-fir or of *Pinus pumilis.*

TEMPO, ad. *tĕm'pō* [It. *tempo*—from L. *tempus*, time]: in *music*, time; the relative degree or rapidity of movement. The rhythmical proportions of notes, as indicated by their form, give them only a relative value, and have no reference to the absolute speed with which the composition should be played. Some compositions require a lively movement; others a slower movement. Of the different terms used to indicate different gradations of movement, the principal, beginning with the slowest, are: *Largo*, broad; *larghetto*, somewhat broad; *lento*, dragging; *grave*, heavy, solemn; *adagio*, slow; *andantino*, moving a little; *andante*, moving; *allegretto*, somewhat lively; *moderato*, moderately quick; *allegro*, lively; *vivace*, with vivacity; *presto*, rapidly; *prestissimo*, with great rapidity. These terms are not always used with precision, and sometimes apply more to the character than to the absolute speed of performance. They are often modified by other qualifying words, as *allegro con brio*, lively and with briskness; *allegro appassionnato*, passionately excited. The *tempo* is indicated with more exactness by a reference to the beat of the Metronome (q.v.). Thus M.M. = 120, signifies that 120 beats of the metronome, each representing a crotchet, are to fill up the space of a minute; M.M. = 60, that 60 quavers are to be performed in a minute.

While the general rule is that the time of a movement is to be steady and unvarying, cases often occur where a certain part of a composition is to have a movement quicker or slower than the rest, this is indicated by such terms as *più vivo*, more lively; or *ritenuto*, kept back; while a return to the original time is expressed by the words *a tempo.* The performer may be required to proceed from one degree of movement to another, not abruptly, but gradually; the terms used to express this are: *rilasciando*, slackening; *ritardando*, retarding; *calando*, calming down; *stringendo*, pressing on; *accelerando*, gradually increasing speed; with some others.

TEMPO RUBATO (stolen time) denotes a mode in which a restless character is imparted by protracting one note beyond its proper duration, and curtailing another, so that the aggregate duration of each measure remains unchanged.

TEMPORAL, a. *tĕm'pō-răl* [L. *tempŏrālis*, lasting but for a time—from *tempus*, time: It. *temporale:* F. *temporel*]: pertaining to time; expressing a time relation; pertaining to this life or world, or to the body only; worldly; secular; not eternal; transitory; measured or limited by time or by this life. TEM'PORALLY, ad. *-lĭ.* TEM'PORAL'ITY, n. *-răl'ĭ-tĭ*, a secular possession. TEM'PORAL'ITIES, n. plu. *-tĭz, especially*, revenues of a clergyman arising from lands, tithes, etc.; also TEM'PORALS. TEMPORAL LORDS, the lay hereditary peerage.

TEMPORAL, a. *tĕm'pō-răl:* see under TEMPLE 2.

TEM'PORAL POWER OF THE PAPACY: phrase susceptible of two very distinct meanings, the confusion of which has led to serious misunderstanding.

I. In one sense, it means the sovereign power which the pope possessed as ruler of the so-called PAPAL STATES (q.v.), in late years the subject of much controversy. The power which the pope exercised within his own states, though modified in its exercise by his spiritual character, was in substance the same as that of any arbitrary sovereign (see POPE): for the history, see PAPAL STATES. Many of the mediæval sectaries asserted the incompatibility of the spiritual with the temporal power in the same person, whether the pope or a baron-bishop. This was the doctrine of the Vaudois; of Pierre de Bruis; and, above all, of Arnold of Brescia, whose sentence to death was the penalty of rebellion quite as much as of heresy. Through the centuries which followed, the anti-papal controversies turned almost entirely on doctrine; and this question did not enter even into the conflict of Gallican and Ultramontane principles. The great Gallican champion Bossuet maintained that the pope's temporal sovereignty was in some sense necessary to the free exercise of his spiritual power. It was not until the aggression of the French republic upon Rome, and the annexation of the papal provinces called the Legations to the Cisalpine republic, and afterward to the kingdom of Italy, by Bonaparte, that the controversy on the temporal sovereignty assumed practical interest. During the later conflict between Pius VII. and Napoleon I., the emperor's design of a still further annexation of papal territory was one of the main causes of dispute; and more recently, after the reannexation of nearly the same portions of the Papal States to the kingdom of Italy, the question again agitated the entire Rom. Catholic world. No formal and authoritative judgment of the Roman Church was pronounced regarding it; but a strong and almost unanimous expression of opinion was tendered to Pope Pius IX., in the form of letters and addresses from bishops and others in every part of Rom. Catholic Christendom, whose tenor is nearly the same. They profess that the possession of temporal sovereignty is no essential part of the privileges of the successor of St. Peter; but they also regard the possession of a sovereignty independent of any particular sovereign as the means providentially established for protection of the spiritual independence of the pope, and of the free exercise of his functions as spiritual ruler of the church. The contrary opinion, held by some distinguished members of the Roman Church, though regarded with great disfavor, was not formally condemned by a doctrinal decision, nor was any action taken on it in the Vatican Council. The more recent annexation of the city of Rome itself to the kingdom of Italy elicited a still stronger expression: see PAPAL STATES.

II. By the second signification of the phrase 'Temporal Power of the Papacy' is understood what would be called

more properly the claim of the pope, in virtue of his office, to a power over the temporalities of other kings and states.

This power may be of two kinds, *directive* and *coercive.* In the first sense, it is a claim which no Rom. Catholic, consistently with his belief of the spiritual supremacy of the pontiff, can be supposed to deny, as it imports nothing more than that the pope, as supreme moral teacher, has power to instruct all members of his church, whether subjects or sovereigns, in the moral duties of their several states.

If the power be regarded as coercive, it is necessary to distinguish the nature of the coercion which may be employed. That coercion may either consist in the threat or infliction of *purely spiritual censures,* or it may involve temporal consequences, such as suspension or deprivation of office, forfeiture of the allegiance of subjects, and even liability to the punishment of death. Considered in the former sense, the claim must be regarded as a natural consequence of the spiritual headship of the church, which is acknowledged by all Rom. Catholics; nor can it be denied that the power to compel sovereigns, by purely spiritual censures, to the fulfilment of the moral duties which their state imposes, is a natural concomitant of the spiritual primacy.

But the papal claim to authority over the temporalities of kings has gone far beyond these limits. From the 10th c. onward, popes have claimed and have repeatedly exercised a power of coercing kings, and of punishing them when refractory, by suspension, by deprivation, and by the transfer of the allegiance of their subjects to another sovereign. This well-known claim has been a subject of controversy in the Rom. Cath. Church between the Gallican (q.v.) and Ultramontane (q.v.) schools; and in the Ultramontane school, two different theories have been devised for its explanation. The first and extreme theory (which holds the power to be a direct one) supposes that this power was given directly from God to St. Peter and his successors, that the two powers are foreshown by the 'two swords,' Lk. xxii. 38, and that the temporal power is a privilege of the primacy by divine law, equally with the spiritual sovereignty itself. According to the second or *indirect* theory, the temporal power is not directly of divine institution, but is an indirect though necessary consequence of the spiritual supremacy; and is given only as a means of completing, and, in a corrupt and disorganized state, rendering more efficacious, the work which the spiritual supremacy is directly instituted to accomplish. It was in this latter form that the theory of the temporal power was defended by the great champion of Ultramontanism, Cardinal Bellarmine; and the celebrated Declaration of the Gallican Clergy (*Declaratio Cleri Gallicani*) 1682 (see GALLICAN CHURCH) was directed against it.

A third view of the temporal power, and one which has found many modern defenders, was propounded by the celebrated Fénelon (q.v.). According to his theory, generally described as the Historical Theory of the temporal

power, the pope does not possess, whether by direct divine appointment or in virtue of the necessities of his spiritual office, any temporal power whatsoever. But he possesses the plenitude of that spiritual power which is required for the government of the church, and he is empowered to enforce it by spiritual penalties, especially by excommunication or deprivation of membership of the church. Now, though excommunication and such other penalties, of their own nature, are purely spiritual, yet the religious sentiment of the mediæval period, and the awe with which it regarded the authority of the church, invested these penalties with certain temporal effects: see EXCOMMUNICATION.

The penalty of forfeiture of certain civil rights was attached by the law of England, in the case of private persons, to the spiritual censure of Excommunication (q.v.). The same penalty was applied by the laws of other countries to the sovereigns themselves: by the law of Spain in the sixth council of Toledo 638; by the law of France, as confessed by Charles the Bald 859; by the law of England, under Edward the Confessor; and by the so-called Saxon and Swabian codes of Germany. The last-named codes recognize in the pope, in certain specified cases, the right to excommunicate the emperor himself; and ordain that if the emperor remain 12 months without being absolved from the excommunication, he shall be deposed. In the appeal of the Saxon nobles to the pope against Henry IV., this law is expressly referred to; and even Henry himself, without denying the force of the law, sought his defense solely in a denial of the charge of heresy which was imputed to him.

From these and similar indications of the public feeling of the mediæval time, the advocates of this theory of the temporal power infer that orthodoxy and obedience to the pope, in all essential matters of faith and discipline, were by the consent, express or tacit, of sovereigns and of peoples accepted as a condition of the tenure of supreme civil authority—a condition similar in its character and objects to that which forms the basis of the limitation settlement of the succession to the English crown to the heirs of the Princess Sophia of Hanover, 'being Protestant.' Hence they conclude that the function really exercised by the popes in relation to heterodox or scandalously immoral sovereigns, or oppressors of the church and church liberties, was in itself a spiritual one, and that the civil consequences which it entailed of deprivation or deposition arose, not from the church law, but from the expressed or understood international civil law of the age. This view of the origin and nature of the pope's power over sovereigns and states may be regarded as the view now commonly received; being set forth not only by Rom. Catholic writers, but also by Leibnitz, Pfeffel, Eichhorn, Voigt, and others.

On the other hand, it is difficult, if not impossible, to reconcile this theory with the language used by the popes themselves in enforcing their claim to temporal authority, and with the arguments on which they rest that claim.

As to the claim of temporal power exercised over nations which had revoked their assent to it (sometimes adduced against the 'historical theory'), it is to be viewed as merely a natural delay in adjustment to a new state of public feeling.

For the history of most of the principal instances of the exercise of this power by the popes, see the separate titles (of the particular popes or sovereigns concerned).—See Gosselin's *Pouvoir du Pape au Moyen Age.*

TEMPORARY, a. *tĕm'pō-rā-rĭ* [L. *temporārĭus,* lasting for a time only—from *tempus,* time]: lasting for a time only; transient; not permanent or in perpetuity. TEM'PORARILY, ad. *-ĭ-lĭ.* TEM PORAR'INESS, n. *-nĕs,* the state of being temporary. TEM'PORIZE, v. *-rīz,* to humor or yield to the current of opinion or to circumstances; in *OE.*, to comply; delay. TEM'PORIZING, imp.: ADJ. complying with times or circumstances. TEM'PORIZED, pp. *-rīzd.* TEM'PORIZER, n. *-rī-zĕr,* one who temporizes; a trimmer. TEM'PORIZINGLY, ad. *-lĭ.* TEM'PORIZA'TION, n. *-rī-zā'shŭn,* the act of temporizing.—SYN. of 'temporary': transient; fleeting; transitory.

TEMPT, v. *tĕmt* [L. *temptārĕ* or *tentārĕ,* to try, to put to the test—from *tentus,* pp. of *tenērĕ,* to hold: F. *tenter,* to tempt]: to test; try; prove; entice; incite; allure; *especially,* to incite to something wrong by presenting plausible or alluring inducements; to solicit to an evil act; to allure; to incite; to provoke. TEMP'TING, imp. *-tĭng:* ADJ. adapted to entice or allure; attractive; seductive. TEMP'TED, pp. *-tĕd.* TEMP'TINGLY, ad. *-lĭ,* attractively; alluringly. TEMP'TER, n. *-tĕr,* one who entices to evil. THE TEMPTER, the devil. TEMPTATION, n. *tĕm-tā'shŭn* [F. *tentation*]: the act of tempting; enticement to evil from the prospects of pleasure or gain; state of being enticed to evil; anything presented to the mind as an inducement to an evil act; a strong inducement offered to the mind, good or bad.—SYN. of 'tempt': to entice; allure; seduce; decoy; attract; induce.

TEMSE, n. *tĕms* [AS. *temes,* a sieve: Dut. *tems,* a strainer]: in *prov. Eng.*, a sieve; a strainer: V. to sift. TEMSE-LOAF, bread made of sifted or fine flour.

TEN, a. n. *tĕn* [Goth. *taihun;* Ger. *zehn;* Dut. *tien;* L. *decem;* Skr. *dasan,* ten]: the sum of nine and one, or the figure or symbol denoting that sum. TENTH, a. *tĕnth,* the ordinal of ten: N. a tenth part; a tithe. TENTH'LY, ad. *-lĭ,* in the tenth place.

TENABLE, a. *tĕn'ă-bl* [F. *tenable,* tenable—from L. *tenērĕ,* to hold]: that may be held; capable of being maintained or defended. TEN'ABLY, ad. *-blĭ.* TEN'ABLENESS, n. *-bl-nĕs,* or TEN'ABIL'ITY, n. *-bĭl'ĭ-tĭ,* state of being tenable.

TENACIOUS, a. *tē-nā'shŭs* [F. *tenace*, tenacious—from L. *tenax* or *tenācem*, holding fast—from *tenēre*, to hold]: holding fast, as opinions; inclined to hold fast; retentive; adhesive; cohesive; tough; obstinate; niggardly. TENA'CIOUSLY, ad. *-lĭ*. TENACIOUSNESS, n. *-nĕs*, or TENACITY, n. *tē-năs'ĭ-tĭ* [F. *ténacité*—from L. *tenacĭtātem*]: quality of bodies which enables them to stick or adhere to others; that quality in bodies which enables them to resist a severe strain without rupturing or splitting—especially applied to metals, as gold, silver, copper, and iron, which can be drawn into wire (see TENACITY): retentiveness, as of memory. TENACE, n. *tĕn'ās*, in *whist*, a holding by the fourth hand of the first and third best cards.

TENAC'ITY: property of material bodies by which their parts resist a force tending to separate them. It is the result of the attractive forces exerted by the particles of matter on one another through the infinitesimally small spaces supposed to exist between them; hence it differs in different materials, and even in the same material at different degrees of temperature. For practical bearings of the T. of solids (especially wood and iron), see STRENGTH OF MATERIALS. As to the T. of metals in consequence of various processes, the following experimental conclusions may here be noted: forging and wire-drawing increase T. in the longitudinal direction: copper and iron have this property more than doubled, while gold and silver have it more than trebled by being drawn into wire. Mixed metals have usually greater T. than simple metals. See ALLOY.

TENACULUM, n. *tē-năk'ū-lŭm* [L. *tenacŭlum*, an instr for holding—from *tenĕō*, I hold]: in *surg.*, a fine-pointed hook for seizing and raising bleeding vessels, such as arteries, for the purpose of tying them.

TENAILLE, n. *tē-nāl'* [F. *tenaille*—from L. *tenacŭlum*, an instr. for holding—from *tenĕō*, I hold]: in *fort.*, work in low relief in the main ditch before the curtain, and between two bastions. It may either have two faces, in a line with the faces of the adjoining bastions, and meeting at the centre in a re-entering angle; or three faces, of which two are prolongations of the bastion faces, and one parallel to the curtain. The T. must be low enough for the defenders to be safe from the musketry-fire on one bastion defending a breach in the other bastion. This work is of great use in protecting the ditch, covering the postern from the enemy's view, etc. See FORTIFICATION. TENAILLE-HEAD, a field-work consisting of a ditch and parapet forming a succession of triangles whose faces flank each other.

TENANT, n. *tĕn'ănt* [F. *tenant*, holding; *tenir*, to hold—from L. *tenēre*, to hold]: one who holds possession of lands or houses under another; one who has the possession and use of any place on certain conditions (see below: also LANDLORD AND TENANT): dweller; occupier: V. to hold or occupy, as a tenant. TEN'ANTING, imp. TEN'ANTED, pp.: ADJ. occupied by a tenant. TEN'ANCY, n. *-ăn-sĭ*, the holding or possession of lands or houses on certain condi-

tions and for a specified time. TEN'ANTLESS, a. *-lĕs*, without a tenant. TEN'ANTABLE, a. *-ănt-ă-bl*, fit for occupation; in a state of suitable repair. TEN'ANTRY, n. *-ănt-rĭ*, the whole body of tenants on an estate. TENANCY AT WILL, in law, occupation by a tenant for no fixed term other than the will or caprice of the landlord or proprietor. In general, courts are averse to assume a tenancy at will if there are materials to satisfy the description of a yearly tenant. Rent is payable according to the time of occupation, and the tenancy can be determined by either party at any time; but the tenant, if too suddenly dispossessed, has right to a reasonable time for removal of furniture, and can, if requisite, re-enter the lands to reap a crop sown. (See LANDLORD AND TENANT.) TENANCY IN COMMON, in law, lawful holding of lands and tenements by two or more persons at once, under several and distinct titles, and not by a joint title. The subject matter of the tenancy may be either real or personal property. Tenants in common have to give account to one another of the profits of the estate; they also have reciprocal right of action on account of waste or depreciation of the estate. TENANCY ON SUFFERANCE, tenancy with no title, and wrongfully continuing. Thus, when the term has ended, and the tenant has got notice to quit, but does not, he continues a tenant on sufferance, and may be ejected at any time, unless a new arrangement is made. TENANT FOR LIFE, in law, one who has not the absolute property, but only an interest in it, which ceases with his own life, or the life of another. An estate for life in lands is classed with freehold estates. (See LIFE-ESTATE.) TENANT IN FEE SIMPLE, one who is absolute owner, the fiction being that all were originally tenants of the crown. A tenant in fee simple has a freehold estate of inheritance, the highest degree of property known to the law. He has an absolute right to the soil and the mines down to the centre of the earth, and has a right to build as high as he pleases. If he dies, the estate goes to his heirs—i.e., his heirs general; but he has power to devise it to whom he pleases, subject to certain restrictions, in cases where the donee is a charitable corporation or trustee for charitable purposes: see MORTMAIN. TENANT IN TAIL: see TAIL: ESTATE: ENTAIL. TENANT IN CAPITE, *kăp'ĭ-tē* [L. *in capite*, in chief]: *anciently*, one who held immediately from the crown.

TEN'ANT RIGHT, legal or equitable property of one who holds land as a renter, in the improvements that he makes therein; consequently such a one's non-obligation to pay advanced rent on account of his own improvements; his title to keep possession at a fair (i.e., fairly adjudicated) rent: in short, the just and equitable status of a renter in face of the landlord. The essentials of T. R. (as conceived by leaders of popular opinion in Ireland, where the question of T. R. has been most agitated in recent times) are summed up in 'the three F's'—Fair Rents, Fixed Tenure, Free Sale. The British parliament has more or less completely established these three points, and by the act of 1881 the tenant may apply to a court to

have a rent fixed (Fair Rents); the tenant (with certain exceptions) may sell his tenancy (Free Sale); when increased rent is demanded, the tenant can obtain through the court a statutory tenancy for 15 yrs. (Fixed Tenure). And if the tenant refuses to pay the advanced rent, he vacates the tenancy, but has lawful claim to compensation both for 'disturbance' and for his improvements.—But the cry of T. R. is not heard outside of Ireland. The larger question of the nationalization of land and the project of the Single Tax (see TAX, SINGLE) are at the front, displacing attempts at reconciling the mutual demands of landlords and tenants by such compromises as are involved in mere Tenant Right.

TENASSERIM, *tĕn-ăs'ĕr-ĭm:* southernmost division of the province of Lower Burmah (the others being Pegu (q.v.) and Aracan (q.v.) and Irrawadi); 9° 30′—19° 30′ n. lat., 95° 50′—99° 30′ e. long.; 46,730 sq. m.; acquired by Britain 1826 after the war.

T. is a narrow line of coast about 500 m. long, with varying breadth from 40 m. at its s. extremity to 80 m. T. is divided into six administrative districts, besides the town of Moulmein: Toungu, area 6,354 sq. m.; Schwe-gyen, 5,567 sq. m.; Salwen, 4,646 sq. m.; Amherst, 15,193 sq. m.; the town of Moulmein, 10 sq. m.; Tavoy, 7,200 sq. m.; and Mergui, 7,760. The principal town is Moulmein; the next in importance being Toungu and Mergui.

Physical Features.—The general aspect of the country is bold and picturesque. A mountain range 5,000 ft. high, forming the e. frontier, is the water-shed between the Tenasserim and Siamese river systems. The s. portion is little else than a wilderness of thickly wooded hills, inclosing long and narrow valleys. The soil of the plains is very fertile, and suited to growth of rice, indigo, cotton, sugar, and vegetables. Tobacco grows chiefly on the banks of rivers in the hills. Forests occupy two-thirds of the area. The largest river, the Salween, has its source in Tibet, but is navigable only a few miles above Moulmein. The principal ports of T. are Moulmein (q.v.), Amherst, Tavoy, and Mergui, of which Moulmein is the best. The Mergui archipelago, off the s. coast of T., consists of almost innumerable islets, some of which are said to be rich in iron ore; and they are famous for edible birds' nests. The country has vast stores of mineral wealth, now absolutely neglected. At Kahan, on Mergui Island, are rich and accessible tin-mines—the ore yielding 75 per cent. of the pure metal not far from the surface.

Botany.—The botanical productions of T. may vie with those of any part of the world. There are more than 100 kinds of timber-trees, the teak the most important. The celebrated *Amherstia nobilis* is the most splendid of the many flowering and ornamental trees. The palm tribe are in great variety.

The *climate* of T. is regulated by the monsoons; and the wet and dry seasons divide the year into two nearly equal parts. The cool season lasts from the cessation of the rains in Oct., when the n.e. monsoon begins, to the middle

of Feb.: afterward the heat increases daily till the s.w. monsoon again brings clouds and rain.

Commerce.—Principal exports are rice, teak and other timber: the first is the staple article of commerce.

Inhabitants.—The people mostly are Burmans proper; but there are other races, as Talaings, descendants of the ancient Peguans; Karens, a dispersed people, inhabiting secluded mountain districts—among whom Christianity has made progress, through the labors of American missionaries; Toungthoos, Khyengs, Shans, Europeans and their descendants, Chinese, and Indians. Pop. (1881) 825 741; of whom 698,304 Buddhists, about 23,145 Hindus, 24,786 Mohammedans, 28,315 Christians.—*The Natural Productions of Burmah and the Tenasserim Provinces*, by the Rev. F. Mason (Maulmain 1850); *British Burmah*, by Capt. Forbes (1878). Pop. (1891) 971,660.

TENBY, *tĕn'bĭ:* parliamentary and municipal borough, and thriving watering-place, of S. Wales, county of Pembroke; 10 m. e. of the town of Pembroke. Its charming situation on a peninsula, overlooking the Bay of Caermarthen, its salubrity, and its bathing facilities have made it one of the most favorite watering-places in Wales: the season is from June to Oct. There are considerable remains of the ancient embattled walls. The parish church is large and beautiful. Fishing is extensively carried on. Pop. (1891) 9,740; increased by one-half in summer.

TENCH, n. *tĕnsh* [OF. *tenche;* F. *tanche*—from L. *tinca*, the tench]: a fresh-water fish of the genus *Tinca* and family *Cyprinidæ* (the Carp family). It is a fish of a thick form, with small scales, and a barbel at each side of the mouth, the teeth on the pharynx compressed and club-shaped. The COMMON T. (*T. vulgaris*) is an inhabitant of ponds and other stagnant waters in Europe and n. Asia. It passes the winter in a torpid state, concealed in the mud. It is of a greenish or sometimes deep yellowish-brown color, more rarely golden. Instances have occurred of its attaining a length of three ft., but a T. of half that length is unusually large. It is very tenacious of life, and, like the carp, can be conveyed to a distance alive in wet moss. The flesh is soft and insipid, except when it is very well fed, when it becomes delicate and pleasant. It is commonly placed in ponds with carp. Its touch was formerly supposed to be curative of disease; and the pike was said to be aware of this, and to refrain from injuring the tench.

TEND, v. *tĕnd* [an abbreviation of ATTEND]: to attend, or be attentive to; to watch; to guard; to accompany; to hold and take care of, in *OE.*, to wait; to expect; to wait upon, as a servant. TEND'ING, imp.: N. in *OE.*, the act of attending; care; attendance. TEND'ED, pp. TEND'ANCE, n. *-ăns*, care; attention; in *OE.*, persons attendant; state of expectation.

TEND, v. *tĕnd* [F. *tendre*, to lead, to conduct—from L. *tendĕrĕ*, to stretch out, to extend: It. *tendere*]: to move in a certain direction; to be directed to an end or purpose; have a leaning; contribute; to aim; to begin to swing round, as an anchored vessel at the turn of the tide. TEND'ING, imp.: N. among *seamen*, a swinging round or movement of a ship upon her anchor. TEND'ED, pp. TEND'ENCY, n. *-ĕn-sĭ*, direction or course toward a place, object, or result; inclination; aim. TEND'ENCE, n. *-ĕns*, OE. for TENDENCY.—SYN. of 'tendency': disposition; inclination; proneness; bent; drift; bias; turn; propensity; aim; scope.

TENDA, COL DE, *kol dĕh tĕn'dä:* a pass over the Maritime Alps: see ALPS.

TENDER, n. *tĕnd'ĕr* [from *tend*, to accompany]: one who tends; a nurse; a small vessel that accompanies a larger, carrying for its use provisions and other stores, or as a dispatch-boat to convey intelligence: on *railways*, a carriage attached to a locomotive, containing the supply of fuel, water, etc.

TENDER, v. *tĕnd'ĕr* [F. *tendre*, to hold out—from L. *tendĕrĕ*, to stretch out]: to present for acceptance; offer in payment or satisfaction of a demand; in *OE.*, to regard; to hold dear; to esteem: N. an offer of money to pay a debt or obligation incurred (see TENDER, LEGAL): an offer in writing made by a contractor or tradesman to execute certain specified work or provide certain things at a certain sum or rate; the thing offered; generally, any offer for acceptance. TEND'ERING, imp. TEND'ERED, pp. *-ĕrd.*

TENDER, a. *tĕn'dĕr* [F. *tendre*, tender, soft—from L. *tener*, soft, young: It. *tenero*]: easily impressed, bruised, or injured; not firm or hard, as plants; not tough, as meat; easily pained; exciting the softer feelings; not hardy; young; feeble; weak; susceptible of the softer passions, as love or compassion; affectionate; likely or apt to give pain, as a *tender* subject; pitiful; careful not to injure, or excite pain; soft· delicate: V. in *OE.*, to regard with kindness. TEN'DERLY, ad *-lĭ*, softly; gently; kindly. TEN'DERNESS, n. *-nĕs*, the state or quality of being tender; softness; state of being easily hurt or pained; compassion; kindness; extreme care not to give pain or offense; cautious care not to injure; softness or pathos of expression; susceptibility of the softer passions. TENDER-HEARTED, a. having great sensibility; very susceptible of the softer passions or emotions. TENDER-HEARTEDNESS, n. the state or quality of being tender-hearted. TENDERLOIN, that part of the loin of beef which lies close to the backbone on the ventral side, and is more tender than the rest; the under-cut.—SYN. of 'tender, a.': soft; effeminate; delicate; compassionate; amorous; gentle; mild; young; weak; kind; humane; pitiful; merciful; benign; benevolent; piteous; clement; susceptible.

TEND'ER, LE'GAL: money of such character that a creditor is by law required to accept it when offered in payment of a debt, in default of any different mode of payment named in the contract or agreement. In the United States, legal T. comprises all U. S. gold coins of the legal weight; U. S. silver dollars of 412½ grains, unless the contract excludes them; smaller U. S. silver coins in sums not exceeding $10; the nickel and copper tokens or coins to the amount of 25 cents. U. S. notes are legal T. for all debts public and private, except duties on imports and interest on the public debt. Gold certificates and silver certificates are legal T. for all public dues whatever: so too are treasury notes issued under act of 1890, July 14: these treasury notes are legal T. also for private debts. The notes of national banks are legal T. for all purposes public and private, except duties on imports, interest on the public debt, and redemption of national currency.

TENDINOUS: see under TENDON.

TENDON, n. *tĕn'dŏn* [F. *tendon*, a tendon—from L. *tendĕrĕ*, to stretch: It. *tendine*]: the sinew which fastens muscle to bone. TEN'DINOUS, a. *-di-nŭs* [F. *tendineux*]: consisting of or resembling tendons; full of tendons; sinewy.—*Tendon*, in anatomy, designates the white fibrous tissue reaching from the end of a muscle to bone or some other structure which is to serve as a fixed attachment for it, or which it is intended to move. In accordance with their form, tendons have been divided into the three following varieties: (1) *Funicular*, or rope-like, as the long tendon of the biceps muscle of the arm; (2) *Fascicular*, as the short tendon of that muscle, and as the great majority of tendons generally; (3) *Aponeurotic* or tendinous expansions, sometimes of considerable extent, serviceable in strengthening the walls of cavities, e.g., the tendons of the abdominal muscles.

The tendons commence by separate fascicles from the end of each muscular fibre, and they similarly terminate by separate fascicles in distinct depressions in the bones, besides being closely incorporated with the periosteum. In some birds, whose tendons are black, the periosteum is black also, from this incorporation. If a T. is ruptured by an accident, or divided by the surgeon, the two ends, if not too far separated, unite with extreme readiness by formation of intervening plastic material which soon acquires great firmness. So rapidly is this repair carried on that, according to Paget, a specimen, six days after division, could bear the weight of 25 lbs.; and another specimen, after 21 days, bore a weight of 56 lbs. When the interval between the two ends of a T. exceeds a certain limit, there will be only an imperfect bond of union, and either partial or total loss of use of the muscle will result.

Among diseases of tendons, *inflammation* is frequent. Independently of gout and rheumatism, the most usual cause is a sprain or wrench in the neighborhood of a joint, occasionally productive of long-continued wearing pains, assuming much of a rheumatic character. In one of the forms of Whitlow (q.v.), known as *Paronychia gravis*, or

tendinous whitlow, the tendons and their sheaths in the finger and hand are the seat of a severe and often destructive inflammation, often confined to one finger, but sometimes extending to the hand and arm, even exposing the bones, and disorganizing the joints. It arises from slight punctures or wounds, with or without inoculation of irritant or poisonous matter, and often without any apparent cause, except derangement of the general health. It begins with severe throbbing pain in the palmar surface of a finger, which extends along the arm: there is extreme tenderness, and some redness and swelling, with great tenseness of the parts. If the inflammation is not checked, suppuration soon ensues, accompanied by much constitutional disturbance; and the matter frequently extends among the muscles. In the early stage, free leeching, followed by hot fomentations, may be useful. The hand should be kept elevated; and an active purgative, with low diet, prescribed. If these remedies fail, a free incision must be made along the centre of the palmar aspect of the finger—giving relief, by removing the tension, and allowing the escape of blood, even if little or no pus is discharged. A generous diet, stimulants, and tonics, are now advisable; and under this treatment the disease generally yields; though occasionally the suppuration produces such results as to render amputation of the arm necessary, or even to cause death. A permanently bent finger, from adhesion of the T. to its sheath, is a frequent result in severe cases.

Tendons are sometimes the seat of syphilitic enlargements or tumors. Malignant tumors scarcely ever spring from tendons; but fibrous tumors and small cartilaginous enlargements are frequent.

Rupture of the tendons is frequently caused by violent muscular action, especially if, from illness or other causes, the muscles have been for some time inactive. The long T. of the biceps cubiti is very liable to this injury, which, in this case, is due more often to the disorganization caused by chronic rheumatic gout than to mere mechanical violence. The other tendons most frequently ruptured are the tendo Achillis, and the tendons of the rectus femoris and the triceps humeri. When a T. is ruptured or divided by a surgical operation (tenotomy), the part attached to the muscle is drawn away from the opposite end for about an inch. Blood is poured out between the ends, but much less than in rupture of muscles. The pain is said not to be very great; a considerable shock, however, is felt, as from a blow received on the part, accompanied by cramp of the muscle, and inability to use the limb; and in rupture of the tendo Achillis, a feeling is described as if the heel were sinking into a hole in the floor. The essential point in the treatment of ruptured T. is to keep the injured part in a state of constant rest and muscular relaxation, so that the separated ends may be approximated as much as possible, and to prevent any violent extension till firm union has been reëstablished.

TENDRIL, n. *tĕn'drĭl* [OF. *tendrillon*, a tendril—from F. *tendre*, tender (see TENDER 3): F. *tendron*, the tender shoot of a plant]: the twining-shoot of a climbing plant by which it attaches itself to an object for support: ADJ. clasping; climbing as or as by a tendril.

TENE'BRIO: see MEAL-WORM.

TENEBRIOUS, a. *tĕ-nē'brĭ-ŭs*, or TENEBROUS, a. *tĕn'ē-brŭs* [L. *tenēbrōsus*, full of darkness, gloomy—from *tenēbræ*, darkness]: dark; gloomy. TEN'EBROUSNESS, darkness; gloom. TENEBRIFIC, a. *tĕn-ē-brĭf'ĭk* [L. *facĭō*, I make]: producing darkness.

TENEBROSI, n. *tĕn-ā-brō'sē* [It.]: in *art*, school of artists, called also Caravaggeschi, after its founder, Caravaggio; characterized by powerful rendering of chiaroscuro.

TENEDOS, *tĕn'ē-dŏs* (Turk. *Bogdsha-Adassi*): island belonging to Turkey, in the n.e. of the Ægean Sea, off the coast of the Troad, about 17 m. s. of the western entrance to the Strait of the Dardanelles. It is about five m. long by two m. broad, rocky, but productive. The chief town, also called T., or *Bogdsha*, has a trade in wine. Pop., Greeks and Turks, more than 5,000.

TENEMENT, n. *tĕn'ĕ-mĕnt* [F. *ténement*, a tenement—from mid. L. *tenemen'tum*, a holding—from L. *tenērĕ*, to hold: It. *tenimento*, a holding, a keeping]: a holding, as of lands or houses; building or house for habitation; one or more apartments in the same building used by one family (see TENEMENT-HOUSES, ETC.); a habitation. TEN'EMENT'AL, a. *-ăl*, pertaining to tenanted lands. TEN'EMENT'ARY, a. *-ĕr-ĭ*, held, or that may be held by a tenant or tenants. TENEMENT-HOUSE, a house or building divided into separate dwellings.

TENEMENT-HOUSES—APARTMENT HOUSES—FLATS: terms, of which the first (including the other two) is defined by law as a house occupied by 3 or more families, living independently, and doing their cooking on the premises; or by more than 2 families on a floor, so living, and having a common right to halls, stairway, etc.—*Apartment House* is a more ambitious term, applied commonly to buildings containing the more expensive flats, those especially which bear a proper name, such as Ivanhoe, Dakota, etc., of which many thousand are listed in New York on real-estate maps.—The term *Flat* originally denoted an entire floor of rooms; it is now applied rather to a suite of rooms for occupancy by one family, whether occupying a whole floor or a floor in part. Flats accord with the legal definition of tenement-houses, but the latter include buildings of all descriptions, used as quarters for many families, who are poor and may occupy but a room or two, whereas flats, which may or may not bear a name, are mostly huge, recent, 5-story to 10-story structures, handsomely built, of monotonous pattern, with one family on a floor and a private hall, when they are called 'single;' or with two families on opposite sides of a hall, when the designation is 'double;' sometimes with four suites of rooms on a floor, two front and two rear. Private houses, however, of 3 or

4 stories, have been converted into flats. The multiplication of flats is rapid and enormous, particularly on the upper half of Manhattan Island, but also to some extent supplanting old buildings on other parts of the island. The rent of a suite of rooms, including parlor, dining-room, sleeping-rooms, and kitchen, varies according to size, style, location, floor, number of rooms, steam-heat or not, from $13 to $60 per month, in general; but the most expensive rent for $150 to $500 a month, or even more. Above $60, usually, steam-heat, elevators, and hall-boys may be looked for; also, in some cases, a restaurant. Flats are commonly well adapted to families of small means, and have free conveniences of dumb-waiter and janitor service. The families have the option of non-acquaintance with each other, without offense. The objectionable feature of many flats is the absence of outside windows for the sleeping-rooms, a fault partially obviated by half-way recesses between buildings in some cases, but not mitigated where there are inclosed air-shafts only, good for little except to bring impure air from below, and liable to be dangerous flues in case of fire—particularly so when, as before the present building laws, they extended down only to the ceiling of an inflammable store on the ground-floor. The regulations now require fire-proof construction for dumb-waiter shafts, though not for air-shafts. For ventilation of inside rooms and water-closets, experiment long ago proved that a double tube of even a few inches diameter, from each interior room to the roof, is effective; these tubes, made of metal, should be tested, modified, and substituted by law, and the ventilating shafts converted into storage closets. Besides this gain, space might be further economized, as in the new Bryan Flats, 133d st., near 7th ave., by providing a gas cooking-stove in a small room, and all laundry conveniences in the basement, with a steam drying-room there, free to tenants.

The building and health depts. of New York give no further information as to the number of tenement and apartment houses than that 13,600 were built 1880–90. Figures given by Mr. Riis are questioned as to the total number. In 1880 the average number of persons to a dwelling was about half that in Brooklyn, Boston, and London. In the 10th ward there were 334,080 persons to the sq. m. Even in 1855 there were 290,000, while in London the density was 175,816 in the most thickly inhabited sq. m. The health dept. of New York found 5 families in a room 12×12 ft. square; another family paying $8.50 a month for a room about 7×7 ft. on top floor. Few rooms had ventilation. The facts led to the Tenement-house Act of 1867. In 1869 the dept. ordered the cutting of over 46,000 windows. It took 5 years to close out 550 cellars as dwellings s. of Houston st. An Improved Dwellings Assoc., and a Tenement-house Building Assoc., as well as several individuals, such as A. T. White and the late Charles Pratt, have done something to provide healthful homes for the laboring classes. For the dark side of city tenement life, see *How the Other Half Lives*, by Jacob A. Riis (1890).

TENERIFFE, n. *tĕn-ĕr-ĭf:* a wine from Teneriffe, one of the Canary Islands, resembling Madeira, but a little more acid.

TENERIFFE, *tĕn-ĕr-ĭf*, or TENERIFE, *tā-nā-rē'fā:* largest of the Canary Islands (q.v.).

TENERIFFE' (or TENERI'FE), PEAK OF; or PICO DE TEYDE, *pē'ko dā tā'ē-dā:* famous dormant volcano, highest summit in the Canary Islands; in the s.w. of the island of Teneriffe; 12,182 ft. above sea-level. The lower slopes of the mountain are covered with forests or with extensive meadows; but the upper ridges and the Peak, properly so called, are wild, barren, and rugged. The Peak and its two inferior neighbors, *Montana Blanco* and *Chajorra*, rise from a rugged circular plain of lava débris and pumice, 7,000 ft. above sea-level, about 8 m. in diameter, fenced in on all sides by an almost perpendicular wall of rock. From the crevices of these mountains sulphurous vapors are constantly exhaling. The Peak is visible more than 100 m. at sea; but the view from it is generally destroyed by the dense masses of cloud which hang over the surrounding sea at an average height of 4,000–5,000 ft., the sky above being almost uniformly clear and bright. For astronomical observations from T., see *Tenerife*, by C. Piazzi Smyth (London 1858).

TENÈS, *tā'nĕs:* seaport of Algeria, 100 m. w. of the city of Algiers. It is fortunate in the agricultural resources of its territory, in its mineral wealth, and in its position for transit-trade. Pop. (1881) town, 2,500; commune, 5,000.

TENESMUS, n. *tĕ-nĕs'mŭs* [L. *tenesmos;* Gr. *teinesmos*, a straining at stool—from Gr. *teinō*, I distend, I strain: F. *ténesme*]: in *med.*, a constant desire to go to stool, with great straining but no discharge (except perhaps mucus), no fecal matter being present in the rectum: it is a common symptom in dysentry, etc. TENES'MIC, a. *-mĭk*, relating to or characterized by tenesmus.

TENET, n. *tĕn'ĕt* or *tē'nĕt* [L. *tenet*, he holds—from *tenĕō*, I hold]: that which a person firmly believes and maintains as a part of his creed; dogma; article of belief.—SYN.: doctrine; opinion; position; principle.

TENFOLD, a. *tĕn'fōld* [*ten*, and *fold*]: ten times as much or as many.

TENGIZ', or TENGHIZ', or TENGUIS': see BALKASH.

TENIERS, *tĕn'yĕrz*, DAVID, the Elder: Flemish artist: 1582–1649; b. Antwerp. For some years he was pupil of Rubens; afterward he visited Italy, where he studied under Adam Elzheimer, and on his return settled in his native city, where he died. The subjects of T.'s pencil are in general very homely, often low—the interiors and exteriors of public-houses, smoking-rooms, rustic games, weddings, etc.; but they are executed in the most vividly realistic manner, with charm of color and happy ease of composition.

TEN'IERS, DAVID, the Younger: Flemish artist. 1610, Dec. 15—1690, Apr. 25; b. Antwerp; son of David T., the Elder. He received his first lessons in art from his father, who, it is said, subsequently placed him in the studio of Adrian Brauwer; but this statement can scarcely be true, for Brauwer (q.v.) was only two years older than himself. The elder T. may be considered founder of a school of which the younger is far the most brilliant and prolific member. T. rapidly rose into distinguished repute. He gained the admiration and friendship of Archduke Leopold, Queen Christina of Sweden, Don John of Austria, the Prince of Orange, the bp. of Ghent, and other dignitaries. T. lived in a villa on the outskirts of Malines, where he studied closely that humble rustic life which he so charmingly depicted in all its aspects. He removed 1647 to Brussels, where he died. He was twice married: first to a daughter of the painter Breughel (q.v.), *Velvet* Breughel, as he was called; and again to the daughter of a councilor at the court of Brabant. He made himself unhappy with a long effort to secure knightly rank.—T. was recognized as one of the great painters of Europe; and his repute has not lessened with lapse of time. The number of his pictures is marvellous. Smith, in his *Catalogue Raisonné*, has described more than 700. England is peculiarly rich in specimens, but they are also liberally scattered over the galleries and private collections of the continent, and, in spite of their number, bring great prices. In the coloring of his skies, the sketching of his trees, the animation and grouping of his figures, the distribution of light and shade, and in his truth to physiognomy, is evinced a rich, fine, and imaginative genius.

TENNANT, *ten'ant*, WILLIAM: remembered as author of *Anster Fair:* 1784–1848, Feb. 15; b. Anstruther, in Fife, Scotland. A cripple almost from his birth, he betook himself naturally to study. After two years at the Univ. of St. Andrews, he was obliged by lack of funds to quit his studies, and was for eight years clerk to his brother, a corn-agent. In 1813 he was fain to accept the situation of parish schoolmaster at Denino, a hamlet about four miles from St. Andrews, with a salary of £40 a year—having in his leisure studied Greek, Latin, Hebrew, French, and German. The year before, he had published his *Anster Fair*, a fantastic poem of rich diction and amazing sprightliness and humor; notable as the first attempt to naturalize in our language the gay *ottava rima* of the Italians; soon afterward adopted by Byron with splendid success in his *Beppo* and *Don Juan*. The poem gave him great repute, and 1816 he became teacher of a school at Lasswade, near Edinburgh; and three years afterward received a mastership in the Acad. of Dollar, Clackmannanshire. Through the influence of Lord Jeffrey, he was appointed, 1831, prof. of oriental languages in the Univ. of St. Andrews. He published, 1840, grammars of Syriac and Chaldee. He was of genial and amiable disposition. Besides other verse, he published, 1822, *The Thane of Fife, a Poem;* 1823, *Cardinal Beaton, a Tragedy;* and 1825, *John Baliol, a Drama.*

TENNENT, *ten'ent*, GILBERT: 1703, Feb. 5—1764, July 23; b. Ireland: Presb. minister. He went to Philadelphia 1718; aided his father in conducting an acad.; was ordained pastor of a Presb. church at New Brunswick, N. J., 1726, where he remained 17 years; accompanied Whitefield on a New England preaching tour 1740–1; and founded a church in Philadelphia of Whitefield followers 1743. He published sermons and addresses.

TEN'NENT, Sir JAMES EMERSON, LL.D.: author: 1794, Apr. 7—1869, Mar. 6; b. Belfast; son of William Emerson. He graduated at Trinity College, Dublin; was called to the bar 1831; married the daughter and heiress of William Tennent, whose name and arms he assumed, 1831; was member of parliament several times; sec. to the Indian board 1841–45; procured passage of an act for copyrighting designs 1843; knighted and made civil sec. to the colonial govt. of Ceylon 1845; was a joint-sec. to the board of trade 1852–67; and was created baronet 1867. He was author of many works, chiefly *Ceylon*, 2 vols. (1859).

TEN'NENT, WILLIAM, D.D.: Presbyterian clergyman: 1705, Jan. 3—1777, Mar. 8; b. in n.e. Ireland; bro. of Gilbert T., and son of the Rev. William T., who came to this country 1718. Before completing his theol. studies, while ill he fell into a trance, and was thought to be dead; but a tremor was noticed under his arm, and burial was postponed. After three days, persistent efforts restored him to consciousness; his convalescence, however, was slow. He described his experience while seemingly dead as a beholding of the heavenly glory; and for years it rendered this world undesirable to him in comparison. He was pastor at Freehold, N. J., from 1733 until his death. A memoir of him by Judge Elias Boudinot gives particulars of the trance.

TENNESSEE, *tĕn-nĕs-sē′:* state; one of the United States of America; 3d in order of admission into the Union; ranking (1880) 6th in product of tobacco, 7th in copper, and 9th in corn and cotton; and (1902) 5th in tobacco production and 6th in pig iron production, and 3d among the S. States; 13th in coal production, and 14th in population; named from Tannassee, Indian for Little Tennessee river; popularly known as the 'Big Bend State.'

Location and area.—T. is in lat. 35°—36° 30′ n., long. 81° 37′—90° 28′ w.; bounded n. by Ky. and Va., e. by N. C., s. by Ga., Ala., and Miss., w. by Ark. and Mo.; extreme length e. to w. 432 m., extreme breadth n. to s. 109 m., water surface 300 sq. m., land surface 41,750, total 42,050 sq. m. (26,912,000 acres); greatest elevation, Unaka Mountains, 5,000 feet above sea-level; cap. Nashville.

Topography.—The surface is strongly diversified, trending from the e. border, 5,000 ft. above sea-level, to the Mississippi river on the w. border, and exhibiting high mountain ranges, a rocky plateau 2,000 ft. above sea-level, a great tract of highlands comprising 9,300 sq. m., a lower and very fertile central basin, a rolling plain 84 m. wide, and a flat. alluvial plain in the Mississippi bottoms, of about 900 sq. m. The Unaka, or Great Smoky Mountains, on the e. border, are a part of the great Appalachian chain, extend entirely across the state, have several river passages, and contain numerous small and fertile valleys. The second mountain range is the Cumberland table-land, which also extends across the state, and has several spurs, that of Walden's Ridge containing peaks much higher than the general level of the table-land. Between the two ranges is the fertile valley of e. Tenn., and between the Cumberland table-land and Walden's Ridge is the valley of the Sequatchee. The famous Lookout Mountain belongs to the Cumberland range, and is partly in Tenn. and partly in Ga. In the civil divisions of the state e. Tenn. extends from the e. boundary to the middle of the Cumberland table-land; middle Tenn. thence to the lower Tennessee river; and w. Tenn. thence to the Mississippi river. The state is well drained by three great river systems. The first on the e. is the Tennessee, which is the chief affluent of the Ohio river, rises in the Alleghany Mountains in Tazewell and Wise cos., Va., receives the Holston and Clinch rivers, flows s.w., enters Ala. at its n.e. corner, re-enters Tenn. at the n.e. corner of Miss., flows due n. through Tenn., and empties into the Ohio at Paducah, Ky. The second is the Cumberland, which rises in Ky., on the w. slope of the Cumberland Mountains, near the Va. boundary, flows w. and s.w. till it enters Tenn. in Clay co., then takes a s. and w. course around Nashville, thence n. and w. to the centre of Montgomery co., passes out of the state in Stewart co., and empties into the Ohio river in Livingston co., Ky. The third is the Mississippi, the w.

boundary of the state. Both the Mississippi and the Tennessee rivers contain several islands.

Climate.—The mean temperature in the n. is in e. Tenn. 56°, middle Tenn. 57°, w. Tenn. 58°; in the central part in e. Tenn. 57°, middle Tenn. 58°, w. Tenn. 59°; in the s. in e. Tenn. 58°, middle Tenn. 59°, w. Tenn. 60°; at Nashville 37°—48° in winter, 75°—81° in summer. The annual rainfall at Knoxville is 59·25 in., Memphis 49·39. Snow falls occasionally, but is never deep or lasting.

Geology.—The predominant formations are the alluvial, tertiary, and cretaceous; the paleozoic, lower Silurian, and sub-carboniferous; the carboniferous; the Silurian; and the lower Silurian and calciferous sand rock; all comprising five distinct belts. The economic properties are coal, iron, copper, limestone and other building stone, marble in large variety, mill-stone, lithographic stone, granite, lead, zinc, asbestos, petroleum, potter's and fire clays, black oxide of manganese, nitrate of potassa, alum, saltpetre, gypsum, sulphate of soda, and salt. Mineral springs of much value abound in the Unaka Mountains, sparkling chalybeate in the Cumberland table-land, and sulphur and chalybeate in the w. portion.—T. is exceedingly rich in forest growths, nearly one-half the entire land surface bearing trees of high commercial value. These include 3 species of ash, 3 of maple, 6 of hickory, about 15 of oak, 2 of pine, 3 of poplar, 3 of elm, 2 of walnut, several of willow, and beech, birch, red cedar, chestnut, cottonwood, cypress, dogwood, sycamore, laurel, holly, hackberry, and box elder. There is an abundance of fruit trees; and in the w. part of the state numerous small fruits and berries, some almost tropical in genus or family, grow luxuriantly. Grasses are prolific; foreign ones thrive well, and there are several indigenous to the state.

Zoology.—The mountains and forests still contain wild animals, e.g., the bear, raccoon, fox, opossum, hare, and squirrel; the rattlesnake, moccasin, and many harmless snakes abound; lizards and horned frogs are often seen; alligators occasionally appear in the bayous of the Mississippi river; and birds of prey, plumage, and song are plentiful throughout the state.

Agriculture.—In 1880 the farm lands covered 20,666,-915 acres (of which 8,496,556 were improved); comprised 165,650 farms, valued with fences and buildings at $206,749,837; contained implements and machinery valued at $9,054,863; and live-stock valued at $43,651,470.

In 1890 there were 174,412 farms, with an aggregate of 20,161,583 acres, valued with buildings and fences at $242,700,540, a decrease in acreage and an increase in farms and value since 1880. The corn crop was 67,-692,000 bushels, valued at $35,200,023; wheat 7,873,000 bushels, $7,636,663; and oats, 6,486,000 bushels, $2,918,-795. The total acreage under cultivation was 8,016,647; and value of products $95,920,200. The farm animals comprised 303,206 horses, value $21,452,283; 229,246 mules, $16,327,002; 377,740 milch cows, $6,414,025; 484,-

578 oxen and other cattle, $5,660,645; 511,118 sheep, $968,722; and 2,242,215 swine, $7,932,059; total animals 4,148,103, value $58,777,736.

The production, value, and acreage of the principal crops in 1894 were: corn, 68,060,316 bushels, value, $26,543,523, acreage, 3,107,777; wheat, 5,897,788 bushels, $3,007,872, acres, 728,122; oats, 6,511,133 bushels, $2,278,897, acres, 445,968; tobacco, 26,724,000 lbs., $2,405,160, acres, 39,300; potatoes, 2,142,580 bushels, $1,049,864, acres, 38,956; hay, 513,962 tons, $5,791,676, acres, 435,510. The cotton production, annually decreasing, and principally confined to the w. and a part of the middle section of the state, was 303,914 bales. The farm animals, 1895, Jan. 1, comprised 344,440 horses, value $15,007,506; 200,153 mules, $9,142,760; 344,469 milch cows, $5,280,710; 546,446 oxen and other cattle, $5,198,999; 493,782 sheep, $767,633; and 1,930,049 swine, $7,002,990; total animals, 3,859,339; total value, $42,400,598.

Manufactures.—T. had (1880) 4,326 manufacturing establishments; employing 22,445 hands; using capital $20,092,845; paying in wages $5,254,775; using materials valued at $23,834,262; and yielding products valued at $37,074,886. The chief industry, according to capital employed was the manufacture of iron and steel, which had 43 establishments, $3,681,776 capital, 3,077 hands, and $2,274,203 value of products. Second, flour and grist-mill products, 990 mills, $3,595,585 capital, 1,849 hands, and $10,784,804 products. Third, sawed lumber, 755 mills, $2,004,503 capital, $3,744,905 products. Fourth, cotton goods, 19 mills, $1,184,600 capital, 1,078 hands, $934,014 products. In 1900 there were reported 8,014 establishments, using $71,814,038 capital; employing 50,504 hands; paying $16,647,638 for wages; and yielding products valued at $108,144,565; the chief of which were:

Industries.	No. establishments.	Capital.	Hands employed.	Value of product.
Lumber	1,732	$12,900,595	11,192	18,127,787
Flour	1,618	5,931,037	1,154	21,798,929
Iron and steel	16	5,381,165	1,979	5,800,624
Foundry and machine shops	97	3,768,565	3,282	4,479,489
Cotton	17	3,767,726	2,108	1,994,9[illegible]5

During 1880–94 the cotton mills increased from 19 to 27; number of spindles from 35,736 to 128,066; and number of looms from 818 to 2,539. With 10,825,000 acres in wood land, there were 442 saw-mills, 169 planing-mills, 29 shingle-mills, 12 stave-mills, 32 sash and door factories, 60 logging railroads, and 21 drying kilns. The sawing capacity of the mills was 4,857,000 ft. per day, and the entire industry yielded products valued at $10,788,000. In the year ending 1894, Jan. 1, T. had 61 tobacco factories, which used 2,804,709 lbs. of leaf tobacco, 23,615 lbs. of scraps, 121,497 lbs. of licorice, 95,069 lbs of sugar, and 54,517 lbs. of other materials; produced 3,861,485 cigars, 1,435,004 lbs. of plug and twist, 129,916 lbs. of smoking, and 739,306 lbs. of snuff; and paid in revenue duty $141,-

330. There were 103 grain and 163 fruit distilleries in operation; 83,671 gallons of fruit brandy were produced; and 201,291 gallons of spirits were rectified.

Mining.—T. has four distinct iron belts: the e., chiefly limonite or brown hematite, along the base of the Unaka Mountains; the dyestone, also hematite, along the e. base of the Cumberland table-land; the Cumberland table-land, argillaceous ores; and the w., limonite, through the highlands on both sides of the central basin. In 1901, the total production of iron ore was 789,494 tons, and pig iron 337,139 long tons. The increase in the production of pig iron was (1885) 161,199 net tons; (1890) 290,747; (1900) 362,190 tons. In 1880 T. ranked 13th in production; 1900 the state ranked 6th.—T. is becoming an important copper producing state and in 1902 it was estimated that one smelting company alone would soon make 9,000,000 pounds yearly. The coal measures of T. form a part of the great Appalachian coal-field, underlie the entire Cumberland plateau, vary from 600 to 2,000 ft. in thickness, have an area of 5,100 sq. m., and comprise 21 counties. They are locally divided into the East Tenn. and the Middle Tenn. divisions, and show considerable diversity. The general character is bituminous, but high grades of gas and cannel coal are abundant in the n. portion, and excellent coking and steam coal in the s. In the year ending 1890, June 30, the product was 1,925,689 short tons, value at mines $2,338,309. There were 39 regular mines and 43 small banks and local mines. In 1901 the production was 3,633,290 short tons, valued at $4,067,389, of which 2,807,931 tons were shipped and 685,919 tons made into coke. There were 14 coking establishments, with 2,135 ovens, which used a total of 739,246 sort tons of coal, and produced 404,017 short tons of coke, value $952,782.

Commerce.—T., having no ports of entry, has no direct foreign trade; but it has two ports of delivery, Memphis and Nashville, for the La. customs district, and a large interior trade. In 1890 its registered shipping comprised 103 vessels, of 18,312.33 tons. In the year ending 1903, June 30, the imports at Memphis had value $76,077, and at Nashville, $45,850.

Railroads.—The development of the railroad system of the state has been steady and substantial since 1855, when there was a total mileage of 466. viz: (1860) 1,253; (1870) 1,492; (1880) 1,843; (1886) 2,138.98; (1902) 3,267.01. Reports for 1894 showed 86 railways in the state, with a total main track of 3,033 miles. The aggregate assessed valuation was $40,703,845, and the highest assessments were against the Nashville Chattanooga and St. Louis, $8,094,170, the E. Tenn. Va. and Ga., $7,994,840, and the Louisville and Nashville, $7,128,229.

Religion.—The Bapt. is the strongest denomination in the state, reporting (1890) 1,065 ministers, 1,545 churches, 125,681 members, 607 Sunday schools, 2,691 officers and teachers, 31,122 pupils church property valued at $1,246,

975, contributions $163,964. During the year 28 missionaries were employed, who organized 3 churches and 8 Sunday schools, travelled 19,000 m., preached 1,881 sermons, and visited 5,810 families. The Meth. Episc. Church, South, ranked second, with more than 400 ministers and about 100,000 members. The Christian Church had about 300 churches, 215 ministers, and 40,000 members. The Cumberland Presb. Church reported 11 presbyteries, 464½ churches, 46 halls, 529 congregations, 39,477 members, and church property valued at $745,605. The Rom. Cath. Church reported the diocese of Nashville, comprising the whole state (established 1837), 1 bp., 29 priests, 36 churches, 1 college, 10 academies, 16 parochial schools with 2,750 pupils, 2 orphan asylums, 1 hospital, 16 female religious institutions, and Rom. Cath. pop. 21,200. The Presb. Church in the United States (South) had about 200 churches, 100 ministers, and 15,000 members. The Meth. Episc. Church reported one conference comprising the whole state, 4 districts, 55 travelling and 194 local preachers, 121 churches, 9,516 members, 134 Sunday schools, 729 officers and teachers, 7,634 pupils, 21 parsonages, church property valued at $102,425, parsonage property $5,355, and contributions for ministerial support $14,587. The Prot. Episc. Church reported one diocese comprising the whole state (organized 1828), 1 bp., 46 clergy, 67 parishes and missions, 5,477 communicants, 307 Sunday-school teachers, 2,773 pupils, total contributions $106,695, Hospital of the Good Shepherd (Nashville), orphan asylum, and several educational institutions. The Presb. Church in the U. S. of America reported one synod comprising the whole state, 4 presbyteries, 86 churches, 58 ministers, 4,462 members, 71 Sunday schools, 567 officers and teachers, 4,590 pupils, and contributions for congregational purposes $54,151. At the tenth international Sunday-school convention, at Denver, 1902, June 26-30, there were reported in T. 4,870 Sunday-schools, 39,849 officers and teachers, 285,266 scholars, total members 325,115.

Education.—The present public-school system of T. is based on laws adopted 1873, and on amendments, permitting incorporated towns to establish graded high schools, passed 1885. Manual training and industrial drawing are a part of the system. In 1893 T. had 701,229 children of school age (6–21 years), of whom 447,938 were enrolled in the public schools, and 308,776 were in average daily attendance. There were 5,825 schools for white and 1,579 for colored children; 6,672 public-school buildings, and public-school property valued at $2,918,000. In 1900 there were 7,185 public school bldgs. and average daily attendance of 338,566; val. prop. $3,063,568. In 1891-2 there were in the state 5 schools of theol., with 41 instructors and 187 students, 4 schools of law, with 22 instructors and 206 students; 4 schools of medicine (regular), with 81 instructors and 1,049 students; 22 colleges of liberal arts, with 110 instructors and 2,382 students in the preparatory dept., and 199 instructors and 2,226 students

in the collegiate—total instructors 453, students 6,050; and 15 colleges for women, with 165 instructors and 2,286 students. The colleges of liberal arts had 380 scholarships, 24 fellowships; and 13 endowed professorships, and 122,-168 bound volumes and 31,890 pamphlets in their libraries. There were 3 public normal schools, normal dept. of Knoxville College, Morristown Seminary and Normal Institute, and the Peabody Normal College; and 2 private ones, the Le Moyne Normal Institute at Memphis, and the Southern Normal University, at Huntington. These combined had 84 instructors and 994 students. There were also 83 endowed academies, seminaries, and other private secondary schools, the most of which were maintained by religious bodies. There were 6 normal schools for colored teachers, with 37 instructors and 1,193 students, and 4 colleges of arts and sciences, with 87 instructors and 1,332 students. The institutions for the superior instruction of women were: Sullius College, Bristol; Brownsville Female College (Bapt.); Union Female College, Brownsville (Meth. Episc.); Memphis Conference Female Institute, Jackson (Meth. Episc., S.); Cumberland Female College, McMinnville (Cumb. Presb.); Soule Female College, Murfreesborough (Meth. Episc., S.); Nashville College for Young Ladies (Meth. Episc., S.); Martin Female College, Pulaski (non-sect.); Synodical Female College, Rogersville (non-sect.); Shelbyville Female College (non-sect.); Tennessee Female College, Franklin; Howard Female College, Gallatin; Ward Seminary, Nashville; Somerville Female Institute, Somerville; and Mary Sharp College, Winchester (Bapt.). These combined had 165 instructors, 2,286 students, and 13,180 vols. in the libraries.

The principal colleges of liberal arts were the Univ. of Tenn. at Knoxville, chartered 1794, which had 80 instructors, 618 students, 275 state scholarships, 4 fellowships, 17,300 vols. in library, 2 professional schools, and the Tenn. Agricultural and Mechanical College—pres. Charles W. Dabney, Jr.; the Vanderbilt Univ., Nashville (Meth. Episc., S.), endowed by Cornelius Vanderbilt, chartered 1873, which had a college of arts and sciences with 100 instructors and 695 students, 20 fellowships, 34 scholarships, 5 prof. schools, 30,000 vols. in library—pres. J. H. Kirkland, PH.D.; the Fisk Univ., Nashville (Congl.), founded for colored youth by Clinton Bowen Fisk, chartered 1867, which had 32 instructors, 498 students, 7,274 vols. in library—pres. J. G. Merrill, D.D.; and the Univ. of the South, Sewanee (Prot. Episc.), chartered 1858, which had 62 instructors, 550 students, 44,000 vols. in library, 27 scholarships—pres. B. Lawton Wiggins, A.M. Other institutions for advanced instruction were: Grant Memorial Univ., Athens (Meth. Episc.); King College, Bristol (Presb.); Chattanooga Univ. (Meth. Episc.); Southwestern Presb. Univ., Clarksville; Hiawasee College (Meth. Episc., S.); Southwestern Bapt. Univ., Jackson; Cumberland Univ., Lebanon (Cumb. Presb.); Bethel College, McKenzie (Cumb. Presb.); Maryville College (Presb.);

Christian Brothers' College, Memphis (Rom. Cath.); Milligan College (Christian); Carson and Newman College, Mossy Creek (Bapt.); Central Tenn. College, Nashville (Meth. Episc.); Roger Williams Univ., Nashville (Bapt.); Greeneville and Tusculum College, Tusculum (Presb.); Burritt College, Spencer; and Washington College, College Station (non-sect.). There were 8 business and commercial colleges, with 28 instructors and 1,398 students.

Libraries and Periodicals.—Last official reports showed that T. had 77 libraries of 1,000 volumes and upward each, containing 392,221 bound volumes and 69,711 pamphlets. In 1894 the libraries were: General 11; school 7; college 25; college society 6; law, 1; Y. M. C. A., 2; and society 1. In 1902 there were 15 daily, 4 semi-weekly, 214 weekly, 1 semi-monthly, 27 monthly, 2 bi-monthly and 3 quarterly periodicals; total, 273.

Illiteracy.—In 1880 there were 1,062,130 persons 10 years old and upward enumerated in T., of whom 294,385 were unable to read, and 410,722 unable to write. Of those unable to write, 216,227 were whites and 194,495 colored, and of the whites, 1,233 were foreign-born. Of 141,064 whites 15–20 years old, 36,177 were unable to write, and of 507,413 who were 21 years old and upward, 118,734 were unable to write, of whom 46,948 were males and 71,786 females. In 1890 there were 1,276,631 persons 10 years old and upward enumerated, of whom 340,140, or 26·6 per cent., were classified as illiterate males of voting age (1900), numbering 487,380, the native born numbered 4,777,393, including 53,433 colored.

Finances and Banking.—In 1890 the state debt was, funded $14,110,000, unfunded $2,239,000—total $16,349,000; co. debts (about half had no debt), funded $2,066,791, unfunded $170,868—total $2,237,659; city (4) debts $6,244,477—total indebtedness $24,831,136; and assessed real and personal valuation $347,508,105. In the year ending 1894, Dec. 20, the state receipts were $2,558,197; expenditures $1,840,073; assessed valuations $319,822,197. In 1902 the total debt was $15,346,300, and the total assessed valuation amounted to $406,216,243, which included $58,328,530 for telephone, telegraph and railroad property; tax rate, 35 cents on $100. In 1902, June, there were 59 national banks (cap. $7,507,200; 137 state (cap. $4,958,135); and 6 private (cap. $91,000); total banks, 202.

History.—T. was settled by whites first by a small colony from N. C. 1754, but the settlers were soon driven away by the Indians. In 1757 another attempt to occupy the terr. was made, and Fort Loudon was built on Little Tennessee river about 30 m. from the present Knoxville. The colonists were not seriously disturbed till 1760, when the Indians besieged and captured the fort, released the whites on condition that they would return to N. C., and butchered the most of them after they had started. In 1761 a larger force, armed and comprising people from N. C. and Va., entered the district, forced the Indians into submission, made a treaty

with them, and established settlements on the Watauga and Holston rivers, under the name of the 'Watauga Association.' N. C., which claimed all the region as its own after its separation from S. C., permitted the settlements to be represented in its colonial assembly 1776, and officially called the region the 'District of Washington.' During the next 7 years the region formed a part of N. C. In 1785 the people of the settlements became dissatisfied with their treatment by N. C., formed an independent govt. under the name of 'the State of Franklin,' and maintained that organization till 1788, when they again acknowledged the jurisdiction of N. C. In the following year N. C. ceded the region to the general govt., which 1790 organized from what is now Tenn. and Ky. 'the Territory of the United States South of the Ohio.' In 1794 a part was set off as the Terr. of Tenn., and 1796 this part was admitted into the Union as a state.—In the revolutionary war the people aided the colonists of N. C., were engaged at King's Mountain and elsewhere, and defeated the Indians 1776, June. In the second war with Great Britain, the Tenn. militia, under Gen. Jackson, were early under arms, fought a bitter and successful war with the Creek Indians as a punishment for their great massacre at Fort Mims, captured Fla., and were conspicuous before and in the battle of New Orleans. In the civil war a majority of the people voted for secession, but in e. Tenn. the majority remained loyal to the Union. The state was the scene of important and almost continuous naval and milit. operations during the war. Among notable battles were those of Fort Pillow, Stone River, Island No. 10 in the Mississippi river, Forts Donelson and Henry, Nashville, Chickamauga, Lookout Mountain, Missionary Ridge, Knoxville (see these titles), and Franklin. The state was raided frequently by the Confederates 1864. In 1865, Jan., a state convention was held, which proposed amendments to the constitution annulling all acts relating to secession. The amendments were ratified by the people in Feb.; the legislature ratified the 13th amendment to the federal constitution in Apr.; the state govt. was reorganized with William G. Brownlow (q.v.) as gov.; the 14th amendment of the federal constitution was ratified by the legislature 1866, July 13; and the same month the state was re-admitted into the Union.—Tenn. has given the country three presidents, Andrew Jackson, James K. Polk, and Andrew Johnson. The constitution of 1796 was amended 1834–5, 53, 65, and 70; and the state capitals have been Knoxville 1794–1811 (excepting 1807, when it was at Kingston); Nashville 1812–15; Murfreesboro 1816 and 1819–25; Knoxville 1817; and Nashville since 1825.

Government.—The executive authority is vested by the constitution (1870) in a gov., elected for 2 years and ineligible for more than 6 years in any term of 8, salary $4,000 per annum. He must be 30 years old, a citizen of the United States, and a citizen of the state 7 years

next preceding his election; and is given the power of veto, but a bill may be passed over his veto by a majority vote of each house. He is aided by a sec. of state, elected by the general assembly in joint session for 4 years, salary $1,800 per annum and fees; by a state treas. and comptroller, each appointed by the general assembly for 2 years, salary of each $2,750 per annum; by an attorney-gen., appointed by the judges of the supreme court for 8 years, salary $3,000 per annum; and by the usual state commissioners. In case of the death, removal, resignation, or disability of the gov., the chief executive authority passes to the president of the senate.—The legislative authority is vested in a general assembly, comprising a senate of 33 members and a house of representatives of 99 members, each elected for 2 years; salary of each $4 per day and 16 cts. mileage. A senator must be 30 years old, a representative 21; both must be citizens of the United States, citizens of the state for 3 years, and residents of the counties or districts represented 1 year. The legislature meets in biennial sessions, in odd-numbered years, limit of session 75 days; and may meet in response to a proclamation by the gov., when business must be confined to matters specified in the proclamation. The right of suffrage is granted to every male person, 21 years old, who has been a resident of the state for 1 year and of the co. or district 6 months, and who has paid his poll-tax.—The judicial authority is vested in a supreme court of 5 judges, elected for 8 years by the qualified voters of the state at large—salary of each $4,000 per annum; in a circuit court, for each of the 16 judicial circuits, of one judge elected in the circuit for 8 years; in a chancery court, for each of the 12 chancery districts, of one chancellor elected in the district for 8 years; in a co. court —divided into a quarterly court and a quorum court— of one-half the justices in the co. for the quarterly court, and 3 justices appointed by the quarterly court for the quorum court; and in justices of the peace with jurisdiction in cases involving $50–$500. The supreme court has almost exclusively appellate jurisdiction; the circuit court has both original and appellate jurisdiction; and the chancery court has original jurisdiction in equity cases involving more than $50. There are also U. S. district courts, salary of judges $3,500 per annum each; and one U. S. circuit court, salary of judge $6,000 per annum. Other officials are U. S. pension agent, salary $4,000 per annum (paid out in year ending 1894, June 30, $7,721,420), and 3 U. S. collectors of internal revenue, salary $3,000 and $4,500 (collections in year ending 1894, June 30, $1,010,291). 1902, July 1, there were in T. 2,767 postoffices, of which 60 were presidential (4 first-class, 7 second-class, 49 third-class, and 2,797 fourth-class); of these 473 were money-order offices.

The successive govs., with their terms of service, are as follows:

State of Franklin.	
John Sevier	1785-88
Terr. of the U. S. s. of the Ohio.	
William Blount	1790-96
State.	
John Sevier	1796-1801
Archibald Roane	1801-3
John Sevier	1803-9
William Blount	1809-15
Joseph McMinn	1815-21
William Carroll	1821-27
Sam Houston	1827-29
William Carroll	1829-35
Newton Cannon	1835-39
James K. Polk	1839-41
James C. Jones	1841-45
Aaron V. Brown	1845-47
Neil S. Brown	1847-49
William Trousdale	1849-51
William B. Campbell	1851-53
Andrew Johnson	1853-57
Isham G. Harris	1857-62
Andrew Johnson	1862-65
William G. Brownlow	1865-69
De Witt C. Senter	1869-71
John C. Brown	1871-75
James D. Porter	1875-79
Albert S. Marks	1879-81
Alvin Hawkins	1881-83
William B. Bate	1883-87
Robert L. Taylor	1887-91
John P. Buchanan	1891-93
Peter Turney	1893-97
Robert L. Taylor	1897-
Benjamin McMillan	1899-1903
James B. Frazier	1903-05

Counties, Cities and Towns.—T. was divided (1900) into 96 counties, James co. having been abolished by the legislature 1890-91, and its terr. restored to Bradley and Hamilton counties, to which it formerly belonged. In 1880 the most populous *counties* were: Davidson 79,026; Shelby 78,430; Maury 39,904; Knox 39,124; Rutherford 36,741; Giles 36,014; Gibson 32,685; Fayette 31,871; Madison 30,874; Wilson 28,747; Montgomery 28,481: Williamson 28,313; Lincoln 26,960; Haywood 26,053; and Bedford 26,025. The most populous *cities and towns* were: Nashville 43,350; Memphis 33,592; Chattanooga 12,892; Knoxville 9,693; Jackson 5,377; Clarksville 3,880; Murfreesboro 3,800; Columbia 3,400; Lebanon 2,296; and Bristol 1,647.—In 1890 the most populous *counties* were Shelby 112,740; Davidson 108,174; Knox 59,557; Hamilton 53,482; Maury 38,112; Gibson 35,859; Rutherford 35,097; Giles 34,957; Madison 30,497; Montgomery 29,697; Weakley 28,955; Lincoln 27,382; Obion 27,273; Wilson 27,148; Greene 26,614; and Williamson 26,321. The most populous cities (1900): Nashville 80,865; Memphis 102,320; Knoxville 32,637.

Politics—State, congressional and presidential elections are held on Tuesday after the first Monday in Nov. The state govt. (1903) was democratic in executive officers and legislature, with a party majority in the latter of 23 in the senate, 67 in the house, 90 on joint ballot. T. had (1900) 12 electoral votes. See PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

Population.—(1790) white 31,913, free colored 361, slaves 3,417, total 35,691; (1800) white 91,709, free colored 309, slaves 13,584, total 105,602; (1810) white 215,875, free colored 1,317, slaves 44,535, total 261,727; (1820) white 339,927, free colored 2,737, slaves 80,107, total 422,771; (1830) white 535,746, free colored 4,555, slaves 141,603, total 681,904; (1840) white 640,627, free colored 5,524, slaves 183,059, total 829,210; (1850) white 756,836, free colored 6,422, slaves 239,459, total 1,002,717; (1860) white 826,722, free colored 7,300, slaves 275,719, total 1,109,801; (1870) white 936,119, free colored 322,331, total 1,258,520; (1880) white 1,138,831, colored 403,528, total 1,542,359; (1890) white 1,336,637, colored 430,881, total 1,767,518; (1900) 2,020,616.

TENNESSEE' RIVER: river in the central U. S., largest tributary of the Ohio; has its origin in the union of the Clinch and Holston, which rise in the Alleghany Mountains of s.w. Virginia, and, flowing s.w. in two parallel valleys, unite at Kingston, in east Tennessee. The river flows still s.w., in the Alleghany valley, entering Alabama close by the n.w. corner of Georgia, whence it flows 60 m. further in the same course; then, turning to the w.n.w., re-enters Tennessee at the n.e. corner of Mississippi, flows n. across the state, then n.w. across Kentucky to its confluence with the Ohio at Paducah, length 800 m., or, from the source of the Holston, 1,100. Its chief branches are the Sesquatchie, Paint Rock, Flint, Duck, North Branch, Hiawassee, Big Sandy, and Clark's. It is navigable 259 m. to Mussel Shoals—a series of broad shallow rapids—also 500 m. above. Chief towns, Florence and Decatur, in Ala.; and Chattanooga, Tennessee.

TENNEY, *tĕn'ni*, SAMUEL, M.D.: physician, publicist, and judge: 1748, Nov. 27—1816, Feb. 6; b. Byfield, Mass. After graduating at Harvard and studying medicine, he began practice at Exeter, N. H., joined the army as surgeon at the battle of Bunker Hill, and served till the close of the war. He had part in the constitutional convention of 1788, and wrote much for the adoption of its result; was probate judge 1793-1800; and member of congress 1800-07. For scientific journals and societies he wrote various papers. He died in Exeter.

TENNEY, *tĕn'ē*, or TENNÉ, *tĕn-nā'*: in *her.*, orange color, one of the tinctures enumerated by heralds, but not of frequent occurrence in coat-armor. It is indicated in engravings by lines in bend sinister, crossed by others barways.

TEN'NEY, WILLIAM JEWETT: editor and author: 1814-1883, Sep. 20; b. Newport, R. I. A graduate of Yale 1832, he became a lawyer in New York, an editor of the *Journal of Commerce* 1841, was an editor of the *Evening Post* two years, of the *Mining Magazine*, and, 1861-82, of Appleton's *Annual Cyc.* He was councilman of Elizabeth, N. J., devised its system of schools, over the board of which he presided, was collector of the port, and two years was judge of a Brooklyn criminal court. He added the 16th vol. to Benton's abridged debates of congress, and published *Military and Naval Hist. of the Rebellion* (1865); also *Grammatical Analysis* (1866). His wife, an authoress, was dau. of Orestes A. Brownson. He died in Newark, N. J.

TENNIS, n. *tĕn'nis* [OE. *tennis*, to drive to and fro: perhaps from F. *tamiser;* Dut. *temsen*, to bolt or searce—affording a lively image of an object driven from one side to the other: possibly from the exclamation '*Tenez!*' employed by early French players in serving the ball]: game in which a ball is driven to and fro with rackets. TENNIS-COURT, place for playing tennis. *Note.*—Skeat suggests a derivation from OF. *tenies*, plu. of *tenie*, L. *tænia*, a band or fillet, and says, 'We might imagine *tænia* to be used either for the band or string over which the balls are played,

or for the streak on the wall as in rackets.'—*Tennis* is a game of great antiquity, finding its analogies in the *sphairisis* of the Greeks, and the *pila* of the Romans. Under the name *paume* (from the ball being at that time struck with the palm of the hand) it is noticed in the Arthurian romances (though not known in England in Arthur's time) and in the earlier records of the dark ages. In the 15th c., it was in great vogue in France among all classes, from the monarch down; and about this time a heavy glove to protect the hand in striking the ball was introduced, and a further improvement was subsequently effected by adoption of the *racket*. The game in England kept pace with its progress in France, and during the 16th, 17th, and 18th c. was generally practiced under the name *tennis*. Many modifications have been introduced, but the legitimate descendant of the paume and tennis of former days is the present game of rackets, played in a court 96 or 97 ft. long, by 33 or 34 ft. wide, and surrounded by walls sufficiently high to prevent the balls from being lost. The players are either two in number, or four divided into two parties. The player or party 'in' *serves* the ball against the head-wall of the court, so as to rebound over a line drawn at a certain distance; it is returned by means of the racket by the player or party 'out,' who must make it rebound from the wall to the other side of the line; and the game is thus carried on till one player fails to strike the ball or causes it to rebound properly. If the player 'in' fails, he changes places with the player 'out;' if the latter fails, the former scores a point. The part of the court on which the player or party in is placed is called the 'service' side; the other, the 'hazard' side. A similar game played without the racket is called *fives, hand-tennis,* or *hand-ball.*

A modern adaptation of the ancient T. is the popular modern T.—more properly Lawn-tennis (q.v.).

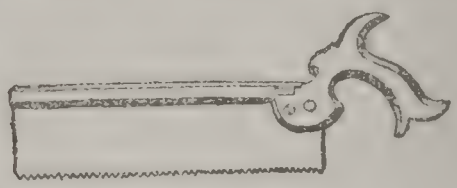
TENNYSON, *tĕn'ĭ-son,* ALFRED, D.C.L., F.R.S., Lord: 1809—1892, Oct. 6: English poet: b. at Somersby, in Lincolnshire, where his father, the Rev. G. C. T., was rector. He was the third son in a large family, of which several other members shared in some measure the genius which has won him rank as the first English poet of his time. Very early, the bent of his nature became obvious; and 1827, T., with his brother Charles, issued a small volume, *Poems, by Two Brothers,* of whose contents little has been preserved. Having entered Trinity College, Cambridge, he gained 1829 the chancellor's medal by a poem in blank verse, *Timbuctoo,* in which there is some impress of his peculiar genius. His literary career properly dates from the appearance (1830) of a volume, *Poems, chiefly Lyrical,* by Alfred Tennyson. It was not received with great favor by the public; but amid much that was weak and immature, it contained pieces which distinctly announced the advent of a true poet. In a notice of the book by Prof. Wilson, in *Blackwood's Magazine,* the promise of the young writer was expressly recognized; but the praise was mixed with censure, which, though it seems on the whole judi-

ous, did not commend itself as such to the poet, who retaliated on 'crusty Christopher' in his next volume, 1832. This consisted of a selection of poems from the previous volume, carefully retouched by the writer, with the addition of pieces produced in the interval, many of which have scarcely been surpassed in beauty by anything that he has since produced. Onward from this time, T.'s reputation rose slowly but surely; and the publication 1842 of *Poems, by Alfred Tennyson* (2 vols.), raised him to the supremacy which he has ever since held by almost universal consent. In 1847 appeared *The Princess, a Medley;* in 1850, the series of elegies *In Memoriam, A. H.*, a tribute of affection to the memory of Arthur Hallam, son of the eminent historian, and the chosen friend of the poet in his earlier years at Cambridge. On the death of Wordsworth, 1850, T. succeeded him as poet laureate, in which capacity he issued, 1852, his *Ode on the Death of the Duke of Wellington.* In 1855 appeared *Maud, and other Poems.* The immediate reception of this little volume was not enthusiastic. While many of its lyrics instantly caught the public ear, *Maud*, as a whole, at first puzzled the critics, and was little better than 'caviare to the general;' and though it has since risen in estimation, the subtle and recondite art in the structure of the poem is probably even now appreciated by only a few of its admirers. But for any little falling off in T.'s popularity on this occasion, a noble amend was made him on his next appearance: *The Idylls of the King* (1859) were received with general enthusiasm. With scarce a whisper of dissent, this work at once took rank as one of the noblest poems in our language. It was followed 1864 by a volume, containing *Enoch Arden*, one of his most finished and successful works; *Aylmer's Field;* a short piece, *Tithonus*, consummate in beauty and finish; and a few other less elaborate poems; one of which, however, *The Northern Farmer*, in the Lincolnshire dialect, is singularly striking. Since then, T. has produced several new *Idylls*, which may be considered to complete the Arthurian cycle: *The Holy Grail* and *Pelleas and Ettarre* (1869); and *Gareth and Lynette*, and the *Tournament* (1872). *The Window* appeared 1870; *Lover's Tale*, 1879; *Ballads*, 1880; and *Tiresias*, 1885. In 1875 T. published his first drama, *Queen Mary*, followed by *Harold* in 1876; *The Falcon* was acted 1879; *The Cup*, 1881; *The Promise of May*, 1882; and a drama based on the life of *Becket*, 1884. Recent collected editions arrange the various *Idylls of the King* in their proper sequence in the legend of Arthur, and enable the reader to appreciate the beauty and significance of the ideal story. Other publications are, *Locksley Hall Sixty Years After* (1886); *Jubilee Ode* (1887); *Demeter* (1889); and *To the Mourners*, an ode on the death of Prince Albert Victor, heir presumptive to the throne (1892). *The Foresters*, a beautiful and characteristic version of the Robin Hood legend, appeared 1892, and contains much that appeals potently to the English sense of patriotism. *In Memoriam* touches the soul of all humanity. Lord T.'s biography, even more than that of most authors, is given,

so far as the public is concerned with it, in the simple enumeration of his works. He lived mostly a retired life in the Isle of Wight, or at Aldworth in Surrey. He was raised to the peerage 1883 under the title Baron Tennyson of Aldworth in the county of Surrey, and of Freshwater in the Isle of Wight. He was buried in the Poets' Corner, near Chaucer, in Westminster Abbey.

T.'s verse is the most faultless in our language, both for the music of its flow and the art displayed in the choice of words. As a painter in words no modern poet has equalled him. But neither to his music nor to his coloring alone is due his great popularity. His *virtue* as a poet doubtless lies in these things; but the pleasure which his poetry gives springs largely from the cordial interest that he reveals in the life and pursuits of men, in his capacity for apprehending their higher and more beautiful aspirations, and in a certain pervasive purity and strength of spiritual feeling.

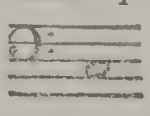
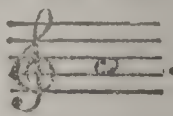
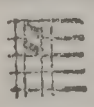
TENON, n. *tĕn'ŏn* [F. *tenon*, a projection made to fit into a mortise—from F. *tenir;* L. *tenērĕ*, to hold]: in



Tenon-saw.

carpentry, the end of a piece of timber reduced in thickness, cut often to the form of an inverted wedge and received into a cavity in another piece, called a *mortise*, in order to form a secure joint: V. to form a tenon or tenons in. TEN'ONING, imp. TEN'ONED, pp. *-ŏnd*. TENON-SAW, a saw with a brass or steel back for cutting tenons.

TENOR n. *tĕn'ĕr* [L. *tenor*, an uninterrupted course, sense, tenor—from *tenĕō*, I hold: It. *tenore:* F. *teneur*]: general or prevailing course, direction, or drift; character; stamp; purport; sense contained.

TENOR, n. *tĕn'ĕr* [same as TENOR 1, so called from the notion of holding or sustaining the dominant note: It. *tenore;* F. *ténor*, tenor]: one of the four classes into which voices can be divided in respect of their compass; the middle part next above the base in a piece of music arranged for four voices; the highest variety of the ordinary male voice; the person who sings the tenor, or the instrument that plays it: ADJ. pert. to the tenor.—*Tenor* generally extends from  to  . Music for tenor voices is most properly written on the tenor or C clef  in which its principal tones come within the staff; but the treble clef is occasionally used, with the notes written an octave above their true pitch.

TENOTOMY, n. *tē-nŏt'ō-mĭ* [Gr. *tenōn*, a tendon; *tomē*, a cutting]: in *surg.*, operation of dividing a tendon: a comparatively recent surgical operation, to relieve some variety of deformity by severing a permanently contracted muscle at its tendinous portion. The invention of subcutaneous tenotomy is due to Stromeyer (1831). The various kinds of knives devised for severing tendons are termed *tenotomes*. The affections in which T. is advantageously employed are club-foot, contractions of the upper extremity from spasm and paralysis, deformity from diseases of the palmar fascia, torticollis or wry-neck, anchylosis of the knee and other articulations, and squinting.

TENPINS, n. *tĕn'pĭnz:* game popular in the United States, played on a long, narrow, smooth bowling-alley, by aiming large round bowls or balls (see BOWL) to knock over the 'pins' or pieces of wood set up on end.

TENREC, *tĕn'rĕk*, or TANREC, *tăn'rĕk:* a member of a genus of mammalia (*Centetes*), nearly allied to moles and hedgehogs, usually ranked in family *Erinaceidæ*. The tenrecs are incapable of rolling themselves up like hedgehogs. They are nocturnal animals, natives of Madagascar and the Mascarene Isles. Three species are known. They are remarkable for spending the hottest part of the year in a dormant state, as some animals in arctic regions spend the winter. Their flesh has a very peculiar flavor, but is acceptable to the natives of Madagascar.

TENSE, a. *tĕns* [L. *tensus*, drawn tight, pp. of *tendo*, I stretch]: drawn tight; stretched; rigid. TENSE'LY, ad. *-lĭ*. TENSE'NESS, n. *-nĕs*, state of being stretched to stiffness. TENSION, n. *tĕn'shŭn* [F.—L.]: the act of stretching or straining; state of being stretched to stiffness; the strain in the direction of the length which a body can bear; the force with which electricity accumulated on the surface of a body tends to escape. TENSI'BLE, a. *-ĭ-bl*, or TENS'ILE, a. *-ĭl*, capable of extension. TENS'IVE, a. *-ĭv*, giving the sensation of tension or contraction. TENS'IVELY, ad. *-lĭ*. TENS'ITY, n. *-ĭ-tĭ*, state of being tense. TENS'OR, n. *-ŏr*, in *anat.*, a muscle that extends or tightens a part. TENSION-ROD, an iron rod applied to strengthen timber or metal framing.

TENSE, n. *tĕns* [OF. *tens;* F. *temps*, time—from L. *tempus*, time]: in *grammar*, time; that form or modification of the verb by which time is expressed, e.g., the present *tense*, the future *tense:* see CONJUGATION.

TENSOR, n. *tĕn'sŏr* [L. *tensus*, pp. of *tendo*, I stretch]: in *anat.*, any muscle which stretches the part on which it specially operates.

TENT, n. *tĕnt* [F. *tente*, lint—from L. *tentārĕ*, to feel, to probe: Sp. *tienta;* It. *tenta*, a surgeon's probe]: in *surg.*, a plug of lint used to dilate or keep open a wound: V. to search a wound; to keep it open with a tent. TENT'ING, imp. TENT'ED, pp.

TENT, v. *tĕnt* [F. *attendre*, to attend to, to expect, to wait for—from L. *attendĕrĕ*, to attend to]: in *OE.* and *Scot.*, to take heed; watch: N. attention; care; heed.

TENT, n. *tĕnt* [F. *tente*, a tent—from mid. L. *tenta*, a cloth stretched, a tent; L. *tentōrium*, a tent—from *tendĕrĕ*, to stretch, to spread: It. *tenda*, any cloth to hang before a window to keep off the sun]: a pavilion or place of shelter formed of canvas, coarse cloth, skins, or the like, stretched on, and sustained by poles, or upon a light timber frame: V. to lodge, as in a tent. TENT'ING, imp.: N. canvas for tents. TENT'ED, pp.: ADJ. furnished with tents, as soldiers; covered with tents, as a field. TENT'LESS, a. *-lĕs*, having no tents. TENT-BED, a bedstead having curtains or hangings stretched over it like a tent.—The *Tent* was doubtless one of the earliest forms of dwellings—among nomadic tribes a primary necessity. The skins of animals, or the larger kinds of foliage, would form the earliest coverings; for which textile fabrics would be substituted as civilization advanced. In the book of Genesis, the patriarchs, Noah, Abraham, Lot, Isaac, Jacob, are represented as dwelling in tents, probably much the same as the modern Arab tents, which are large structures, very rude in form, covering

Fig. 1.—Arab Tent.

considerable ground, but of small height. Among the Nineveh sculptures is a representation of the T. of the King Sennacherib, which, like modern tents, was supported by ropes; numerous tents of the officers and common people are likewise shown.

The early Greek, and afterward the Macedonian tents were small coverings of skins, under each of which two soldiers slept. Alexander the Great is said to have had a pavilion of extraordinary magnificence: its roof, one mass of gilded embroidery, was sustained by eight pillars covered with gold. In the centre, was the royal throne; and 100 beds could be made up within the temporary edifice.

The Roman soldiers seem to have used two sorts of tents—one, a T. proper, of canvas or like material, with

Fig. 2.—Roman Tent.

two solid upright poles, and a roof-piece between them; the other, more resembling a light hut, of a wooden skele

ton, covered by bark, hides, mud, straw, or any material which afforded warmth. Of these tents, the poles of the first would have been too cumbrous for carriage, and were probably cut afresh at each halting-place; the latter was evidently unsuited to removal, and was erected probably only for winter-quarters or a long sojourn. The Roman T. held 10 soldiers, with their *decanus*, or corporal.

In Persia are many tribes who dwell constantly in tents, which, naturally, they have brought to considerable perfection. They make them nearly hemispherical, with a wooden framework, and covered with felt, while worked hangings close the aperture. This felt admits of much taste in decoration.

The nomadic Mongols live in tents, which are cleverly

Fig. 3.—Mongol Tent.

constructed, of great size, and affording considerable comfort.

Modern military tents are of linen or cotton canvas, sup-

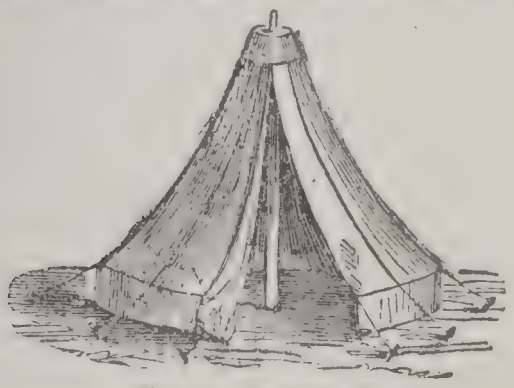


Fig. 4.—Bell-tent.

ported by one or more poles according to shape, and held extended by pegs driven into the ground. British tents comprise the hospital-marquee, a large oblong tent with high side-walls; and the round-tent, or bell-tent for troops.

Milit. tents in the United States comprise the hospital-tent, wall-tent, wedge-tent, a modification of the French shelter-tent, and the poncho-tent. All are of white duck, except the poncho, which is of rubber. The hospital-tent is 15 ft. sq., 12 ft. high to ridge, and 4½ ft. in height of walls: it is open at both ends so that several may be erected together to form a continuous ward, and accommodates 6 to 8 beds. The wall-tent, 9 ft. sq., 8½ ft. high to ridge, with walls 3 ft. 9 in. high, and fly, is for officers; the wedge or common tent, 6 ft. 10 in. high, 8 ft. 4 in. wide, 6 ft. 10 in. long, is for enlisted men, and accommodates 6;

the shelter-tent consists of two pieces of duck 5 ft. 6 in. by 5 ft. 5 in., buttoned together and stretched over a ridge-pole; and the poncho is a sheet about 6 ft. sq., with a slit in the centre through which the soldier puts his head—several such sheets united form the tent. The old Sibley tent, very similar to the Sioux lodge, formerly popular in the army, was discontinued during the civil war.

TENTACLE, n. *tĕn'tă-kl*, usually in the plu. TEN'TACLES, *-klz*, or TENTACULA, n. plu. *tĕn-tăk'ū-lă* [F. *tentacule*, a feeler, or one of the antennæ of insects—from new L. *tentac'ŭlum*, a feeler—from L. *tentārĕ*, to touch]: one of the slender flexible organs possessed by many of the lower animals, e.g., snails, insects, crabs, cuttle-fish, etc.; and used for feeling, exploring, prehension, locomotion, or for attachment to other bodies; a feeler. TENTAC'ULAR, a. *-lĕr*, pert. to tentacula or feelers. TENTAC'ULATE, a. *-lāt*, or TENTAC'ULATED, a. having tentacles. TENTAC'ULIF'EROUS, a. *-lĭf'ĕr-ŭs* [L. *fero*, I bear]: having or bearing tentacles. TENTAC'ULITES, genus of small annulated tapering shells, abundant in some strata of Silurian age, the structure of the shell showing great affinities to pteropodous mollusks, among which tentaculites are now classed. The form of the shell is a long, sharp cone, and the remains abound especially in the Tentaculite Limestone of the Water-lime group near the top of the Silurian series in N. Y.

TENTATION, n. *tĕn-tā'shŭn* [F. *tentation*, temptation—from L. *tentātĭō* or *tentātĭōnem*, trial, proof—from *tentārĕ*, to try]: in *OE.*, trial; temptation.

TENTATIVE, a. *tĕn'tă-tĭv* [L. *tentārĕ*, to try]: experimental.

TENTER, n. *tĕn'tĕr* [L. *tentus*, pp. of *tendĕrĕ*, to stretch]: a machine for stretching cloth by means of hooks, called *tenter-hooks:* V. to hang or stretch on tenters. TEN'TERING, imp. TEN'TERED, pp. *-tĕrd*. TO BE ON TENTER-HOOKS, to be on the rack; to be in a state of suspense or anxiety.

TENTER, n. *tĕn'tĕr* [from TENT 2]: one who tends or superintends something, such as the proper working of a machine or machines by others.

TENTERDEN, *tĕn'tĕr-dĕn:* municipal borough and market-town in the weald of Kent, England; 18 m. s.s.e. of Maidstone. The church, which contains portions of Early English, is surmounted by a massive and lofty perpendicular tower. Tradition asserts that a quantity of stones which had been gathered for strengthening the sea-wall of the Goodwin Sands were used in building this tower; and that, when the next storm came, the tract of Goodwin Sands, formerly joined to the mainland, was submerged: thus arose the popular saying that 'Tenterden steeple was the cause of the Goodwin Sands.'—Pop. (1871) 3,669; (1881) 3,620 ; (1891) 3,429.

TEN'TERDEN, CHARLES ABBOTT, Lord: English lawyer: 1762, Oct. 7—1832, Nov. 4: b. Canterbury. He studied at the King's School connected with the cathedral, and received aid to proceed to Oxford, where at Corpus Christi College he graduated with the chief distinctions at the university. After being a student of the Inner Temple 1795, he was called to the bar; and in spite of a husky voice, a leaden countenance, and painfully timid manners, his great activity of mind, good taste, scholarship, scientific and legal knowledge, soon gave him a large business. He published 1802 his treatise *On Merchant Ships and Seamen.* In 1807 his fees were more than £8,000. In 1816 he was appointed a judge; was knighted 1818, and chosen to succeed Lord Ellenborough as chief-justice of the king's bench; and 1827 was raised to the peerage. In the house of lords he vigorously opposed the Rom. Cath. Relief Bill; and in his last speech he made a vow that if the Reform Bill, that 'appalling bill,' passed, he would never again take his seat as a peer. The success of the measure, it is believed, affected his health, and soon afterward he died.

TEN THOU'SAND, RETREAT OF THE: return to Europe of the Greek mercenaries who were in the expedition of the younger Cyrus against his bro. Artaxerxes II. of Persia. The retreat—described by Xenophon, the Greek historian, in the *Anabasis*—began B.C. 401, after the battle of Cunaxa, when the Greek commanders were assassinated by order of Tissaphernes. The retreat was conducted by Xenophon, who was with the army as a sort of 'volunteer aide' to Proxenus, one of the Greek generals, and as a seeker of novelty and adventure. But by Xenophon's prudence and skill, the Grecian host was in 5 months conducted safely to the shores of the Bosporus, after a march of more than 1,000 m., everywhere beset by enemies, and confronted by hardship. See XENOPHON.

TENTH, TENTHLY: see under TEN.

TENTORIUM, n. *tĕn-tō'rĭ-ŭm* [L. *tentōrĭum*, a tent—from *tendo*, I stretch]: in *anat*, a projection of the duramater, separating cerebrum from cerebellum.

TEN TRIBES: people of the kingdom of Israel as distinguished from the kingdom of Judah: see JEWS.

TENT-WINE, n *tĕnt-wīn* [Sp. *tinto*, deep-red—from L. *tinctus*, pp. of *tingĕrĕ*, to stain]: a kind of Spanish wine, used for sacramental purposes.

TENUIROSTRES, n. plu. *tĕn'ū-ĭ-rŏs'trēz* [L. *tenŭis*, slender; *rostrum*, a beak]: in obsolete classification, a very unnatural group of the order *Insessores* or perching birds, characterized by long slender beaks, some straight and some curved. Some feed on insects, some chiefly on the honey of flowers. To this tribe belong the Creepers (*Certhiadæ*), Sun-birds (*Cinnyridæ*), Humming-birds (*Trochilidæ*), and Hoopoes (*Upupidæ*), now distributed, like the old equally artifical groups *Dentirostres*, etc., according to their true affinities. TENUIROSTRAL, a. *-rŏs'trăl*, slender-beaked; pertaining to the tenuirostres.

TENUITY, n. *tĕ-nū'ĭ-tĭ* [F. *ténuité*—from L. *tenuĭtas* or *tenuĭtātem*, thinness—from *tenŭis*, thin or slender: It. *tenuĭta*]: thinness; slenderness; rarity, as of the air; lightness; simplicity or bareness, as of style. TENUOUS, a. *tĕn'ū-ŭs*, thin; slender; rare, as the air. TEN'UOUSLY, ad. *-lĭ*.

TENURE, n. *tĕn'ūr* [F. *tenure*, a tenure—from *tenir;* L. *tenērĕ*, to hold]: a holding; the conditions under which a tenement is held; holding or manner of holding real estate: manner of holding in general. TENURE OF LAND, anciently in England and the greater part of Europe, an accompaniment or immediate consequence of the Feudal System (q.v.) established during the middle ages. The feudal system was extended to England by the Norman barons soon after the Conquest, with concurrence of William I., much to the dislike of the Saxons, whose grievances grew until they found vent in Magna Charta, which was in fact an attempt to restore their earlier constitution. The chief fiction, however, of a relation between the crown and the holders of land, was not abolished. The crown was nominally the lord paramount, and there were intermediate lords called mesne lords, of whom the tenants held. Gradual changes have ensued, with the result that in England at the present day the two tenures are freehold and copyhold. The leading characteristic of freehold is that practically the feudal relation between the crown and the holder is cut off, and the holder is entirely his own lord and master, can sell the estate, devise it by will, give it away, and do what he likes with it, free from any interference or payment to the crown. In copyhold, the feudal relation is kept up to a certain extent between the lord and the copyhold tenants, who must in form pay rents more or less nominal, and fines and Heriots (q.v.) to the lord on alienating the lands or succeeding thereto. Yet, practically, the copyholder does not materially differ from a freeholder except that he is liable to these petty and harassing acknowledgments toward a stranger; and by recent statutes he can compel the lord of the manor to commute these fines and incidents, and convert the tenure into freehold.

In Ireland the tenure of land is almost identical with that in England; but see TENANT RIGHT.

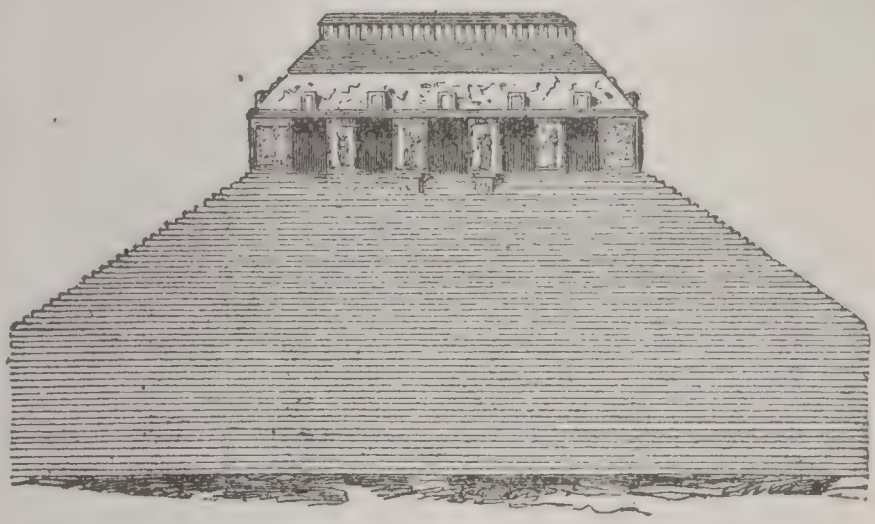
In Scotland the feudal principle is still operative to a great extent, resembling in many respects the Eng. copyhold tenure. Every piece of land there has generally its lord or superior and its vassal, that is to say, the vassal has the *dominium utile*, or actual enjoyment, while the superior has a kind of superior interest, or *dominium directum*, which consists in his drawing a rent called a feu-duty, which the vassal is bound to pay, or to forfeit the land. Recent statutes have modified the system in some details. But besides this feudal relation between the crown and its vassals, the vassals may subdivide the property and create intermediate estates without limit, each vassal being in turn the superior to his subvassal; and this endless chain

of relationships grievously complicates the conveyancing: see CONVEYANCING.

On Land Tenure in general, see FEUDAL SYSTEM: FEU: FEE, ESTATE IN: ALLODIUM: FREEHOLD, ESTATE OF: SOCAGE: ENTAIL: DEMESNE: COPYHOLD: ESTATE: REAL ESTATE: LANDED PROPERTY: ETC.

TENUTO, a. *tā-nū'tō* [It., held]: in *mus.*, a term applied to a note or series of notes having to be held or kept sounding the full time.

TEOCALLI, n. *tē'ō-kăl'lĭ* [Mexican, God's house]: a pyramid for the worship of the gods among the anc. Mexicans and some other aborigines of America. Many of these structures remain, more or less ruined. They were in the form of four-sided pyramids, usually of two, three, or more stories or terraces; with the temple, properly so-called, upon a platform on the summit. The largest and most celebrated is the pyramid of Cholula, measuring 1,440 ft. each way, and 177 in height; it is much defaced,



Teocalli at Palenque, Yucatan.

and the temple on its summit has been removed. The teocallis in Yucatan are in far better preservation; they are not generally built in terraces, but rise at an angle of 45° to the level of the platform, with an unbroken series of steps from base to summit. The temples on their summit are sometimes ornamented with bas-reliefs in stucco and hieroglyphic tablets, and the roof is formed by courses of stone approaching each other, and furnished with projections like dormer windows. Like the teocallis are the palaces of the Aztec kings or chiefs, but having the pyramid smaller, less prominent, and oblong in plan; while the building, larger and more elaborate, consists mostly of a stone basement, with square doorways, but without windows, surmounted by a structure which seems directly copied from wood-work. On some of these façades are also rude pillars and grotesque carvings, and often there are chambers in the interior. A palace and temple are sometimes found attached; and in a few cases (the most remarkable the Casa de las Monjas, at Uxmal) the building are arranged round a courtyard. See MEXICO.

TEPAL, n. *tĕp'al* [altered from *petal*, and with a reference to *sepal*]: in *bot.*, a petal; one of the portions of a perianth.

TEPEE, n. *tē-pē':* American-Indian wigwam or tent.

TEPEFY, v. *tĕp'ĕ-fī* [L. *tepĕfac'ĕrĕ*, to make moderately warm—from *tepērĕ*, to be tepid; *facĭō*, I make]: to make or become moderately warm. TEP'EFYING, imp. TEP'EFIED, pp. *-fīd.*

TEPIC, *tĕp-ĭk'* or *tā-pēk':* town of Mexico, state of Jalisco; on a height 400 m. n.w. of the city of Mexico. T. is the residence, during the rainy season of many of the inhabitants of the port of San Blas, about 25 m. distant. Pop. 10,000.

TEPID, a. *tĕp'ĭd* [L. *tepĭdus*, moderately warm—from *tepērĕ*, to be moderately warm: It. *tepido*]: moderately warm; lukewarm. TEP'IDNESS, n. *-nĕs*, or TEPIDITY, n. *tĕ-pĭd'ĭ-tĭ*, moderate warmth; lukewarmness. TEPIDARIUM, n. *tĕp'ĭ-dā'rĭ-ŭm* [L.]: in the *anc. Roman baths*, the apartment in which the tepid bath was placed; the boiler in which the water was warmed.

TEPLITZ, *tĕp'lĭts*, or TÖPLITZ, *tœp'lĭts:* watering-place of n. Bohemia, one of the most celebrated of the German spas; pleasantly situated on the Saubach (Pig's Stream), 16 m. n.w. of Leitmeritz, 30 m. s. of Dresden. The chief building is the palace of Prince Clary, to whom the town in great part belongs; and behind this building are a park and gardens, the principal places of resort. Within their limits are the theatre and the Gartensaal, the latter a reading, dining, and ball room. On the hill, behind the palace is the Schalckenburg, a sort of tavern, built in imitation of a castle, and commanding a wide view from its prospect-tower. The baths are supplied from 11 hot alkalo-saline springs, whose temperature ranges from 90° to 117° F. They are taken (bath or drink) exceedingly hot, and have great remedial virtue in gout, rheumatism, etc.—Pop. of T. with the adjoining village Schönau, about 16,750. About 10,000 strangers annually visit the baths.

TER, *tĕr* [L. *ter*, thrice—from *tres*, three]: a prefix in many chemical and other scientific terms, meaning 'thrice in the third degree.

TERACHITES, n. plu. *tē'rā-kīts:* immediate descendants of *Terah* through Abraham, Nahor, and Haran; e.g., the Israelites, the Ishmaelites, the Midianites, and the Ammonites.

TERAMO, *tĕr'ā-mō* or *tā'rā-mō* (anc. *Interamna*): town of s. Italy, in the province of T., at the junction of the Tordina and Vezzola, 28 m. n.e. of Aquila, 12 m. from the coast; 876 ft. above sea-level. It is well built, with long and rather wide streets, has a cathedral, a public library, a foundling-hospital, and a botanic garden; and has active trade in corn, wine, and olives. Pop. (1881) 8,634; with suburbs, 13,988; (1892) 21,000; (1901) 24,563.

Ancient *Interamna* (of which the name T. is an Italianized form) was a city of Picenum, in the territory of the

Prætutii. In the middle ages, it bore the name also of Abrutium or Aprutium (supposed corruption of Prætutii), whence the modern name of the dist., Abruzzo. Vestiges of the ancient city—the amphitheatre, temples, baths, aqueducts, etc.—are traceable, and many statues, altars, and inscriptions have been discovered. In the plain below T. 1460, July 27, was one of the bloodiest battles ever fought in Italy, between the army of John, Duke of Anjou, and the Milanese allies of Ferdinand I, of Aragon. After the contest at Castelfidardo (1860), T. was the first Neapolitan city that opened its gates and gave joyful welcome to King Victor Emmanuel. Pop. of province (1901) 307,444.

TERAPH, n. *tĕr'ăf;* usually in plu. TERAPHIM, *tĕr'ă-fim*, or TER'APHIN, *-fin* [Heb. *teraphim*, nourishers—but the etymology is obscure]: in the Old Test., tutelary household idols with probably something of a human figure, by whose worship families expected to be rewarded with domestic prosperity. They were employed, seemingly in connection with divination, both in the family and in public. The gods or images which Rachel stole from her father are called Teraphim, and Saul was reproached by Samuel for stubbornness which is like Teraphim; Saul's daughter placed a Teraph in David's bed to conceal his flight, etc. Such use of Teraphim seems to have been held not incompatible with the worship of Jehovah, but resort to them was strongly condemned by the prophets.—See Judges xvii. 5; Hosea iii. 4; Gen. xxxi. 19, 30; Zech. x. 2; I Sam. xv. 23; xix. 13; II K. xxiii. 24.

TERAPIN: see TERRAPIN.

TERATOLITE, n. *tĕr-ăt'ŏ-līt* [Gr. *terăta*, signs or wonders; *lithos*, a stone]: a mineral of a pale-violet or bluish-gray color, often with reddish-white veins or spots; the *Ter'ra mirac'ulōsa Saxon'iæ* [L. the miraculous earth of Saxony] of old authors, much valued on account of its supposed medicinal properties.

TERATOLOGY, n. *tĕr'ă-tŏl'ŏ-jĭ* [Gr. *terăta*, signs or wonders; *logos*, a discourse]: branch of physiology which treats of malformations and monstrosities in animals or plants: see MONSTROSITY.

TERBIA, n. *tĕr'bĭ-ă:* a supposed metallic oxide of the supposed metallic base TER'BIUM, n. *-bĭ-ŭm;* a very rare mineral, a compound of *erbia* and *yttria:* see YTTRIUM.

TERBURGH, *tĕr'bĕrg*, GERHARD: Dutch subject-painter: 1608–81; b Zwolle, Holland; of an old and respectable family. He studied first under his father, an artist of note, and afterward visited Germany, Italy, Spain, England, and France, painting in Paris, Münster, and Madrid. Returning to Holland, he settled at Deventer, of which town he became burgomaster. The elegant ostentatious life of his time, with its superfine courtly manners, and splendid costume, found in T. an admirable painter. The central figure in many of his pictures is a young lady with fair hair, and dressed in white satin. His most famous piece is a picture containing portraits of the 69 plenipotentiaries who drew up the treaty of Westphalia. T. is

notable for delicacy of execution, and a certain tender fusing of the colors; he excels also in the aërial perspective. His figures are well drawn, and have refinement and frequent grace. T.'s works are in many Eng. collections; and in the galleries of Dresden, Munich, Berlin, Vienna, Amsterdam, and the Louvre.

TERCE, n. *tĕrs* [F. *tierce*, a third—from L. *tertĭus*, third—from *ter*, thrice]: a third part; a cask containing 42 gallons, so called from its being the *third* part of a pipe or butt: spelled also TIERCE, *tĕrs:* in *Scots law*, a *widow's terce* is her liferent of *one-third* of the whole heritage in which her husband was infeft; but she has no *terce* of superiorities, feu-duties, leases, etc. (see DOWER): the office of the third canonical hour, one of the 'Lesser Hours' in the Roman Breviary; said at about 9 A.M. (see CANONICAL HOURS). TERCED, a. *tĕrst*, vested in her *terce*, as a widow.

TERCEIRA, *tĕr-sā-ē'râ:* one of the Azores Islands (q.v.), second in size, and one of the central cluster; e. from San Jorge; 162 sq. m. Steep rocks of lava line almost the whole coast; the island is accessible only at few places, and these are defended by fortifications. The soil is fertile; the plateaux of the mountains afford excellent pastures, and cattle-breeding is an important industry. Principal articles of export are wine, timber, and orchil. Chief town of the island, Angra, the cap. pop. (1887) 14,000. The gov. and the bp. of the Azores reside at Angra, in the fort. —Pop. of island (1887) 46,528.

TERCEL GENTLE: see under TASSEL 2.

TERCENTENARY, n. *tĕr-sĕn'tē-nā-rĭ* [L. *ter*, thrice, and Eng. *centenary*]: a day commemorative of some important event, etc., which took place three hundred years before.

TERCET, n. *tĕrs'ĕt* [F.—from *tiers*, third]: in *mus.*, a third; in *poetry*, a group of three rhyming lines; a triplet.

TERCINE, n. *tĕr'sĭn* [F.—from L. *tertĭus*, third]: in *bot.*, the third coat of the ovule, covering the central nucleus; really a layer of the primine or secundine.

TEREBENTHENE, n. *tĕr'ĕ-bĕn'thēn* [from TEREBINTH, which see]: a hydrocarbon found in oil of turpentine.

TEREBINTA'CEÆ: see ANACARDIACEÆ.

TEREBINTH, n. *tĕr'ĕ-bĭnth* [L. *terebin'thus;* Gr. *terebin'thos*, the terebinth]: the turpentine-tree; the *Pistăcĭa terebin'thus*, ord. *Anacardiăcĕæ*, native of s. Europe and n. Africa, yields a liquid resinous exudation known as Chian and Cyprian turpentine. TER'EBIN'THINE, a. *-bĭn'thĭn*, pertaining to turpentine, or resembling it in taste or other qualities; also TER'EBIN'THINATE, a. *-thĭn-āt:* N. a medicine or application consisting of true turpentine, or turpentine of the firs.

TEREBRANTIA, *tĕr-ē-brăn'shĭ-a:* section of the insect order *Hymenoptera*, distinguished by the females having an ovipositor: to this section belong Sawflies (*Tenthredinidæ*), Ichneumons, Gall-insects, etc.

TEREBRATE, v. *tĕr'ĕ-brāt* [L. *tĕrĕbra*, an instr. for boring—from *tero*, I wear]: to perforate, as with a gimlet; to bore. TER'EBRATING, imp. TER'EBRATED, pp.

TEREBRATULA, n. *tĕr'ĕ-brăt'ū-lă* [dim. of L. *terĕbrātus*, bored or perforated, in allusion to the perforation of the beak—pp. of *terĕbrārĕ*, to bore—from *tĕrĕbra*, a borer]: a genus of deep-sea brachiopod bivalves found fossil, of which all the species are extinct. In nearly allied living forms the animal is attached to the shell by a pedicle, and the brachial disk is three-lobed, the centre lobe being elongated and spirally convoluted. The shell is smooth, with truncated perforated beak, the foramen being circular. The shelly loop is very short and simple. The shell of this genus and some of its allies is covered with minute quincuncial perforations, sometimes visible to the naked eye, but usually requiring a lens of low power to distinguish them. The generic title is now restricted to shells with a short internal loop. The species with long loops are grouped together under the name *Waldheimia*. The fossil species are numerous, and are found from the Devonian age upward. The genus gives name to the most extensive family of brachiopods, represented in both extinct and recent species, the *Terebratulidæ*.

TEREDO, n. *tĕr-ē'dō* [L. *tĕrēdo;* Gr. *tĕrēdōn*, a worm which gnaws wood, clothes, etc.—from L. *tero;* Gr. *teirō*, I rub, I grind]: marine mollusk, elongated and worm-like, lodged in a somewhat globular shell at the inner extremity of a tubular burrow partly or entirely lined with shell, very destructive from its habit of boring into and taking up its lodgment in wood; *Tĕrēdo navālis* is the shipworm. TEREDINES, n. plu. *tĕr-ē'dĭ-nēz*, the borers; the teredos.—*Teredo* is a genus of lamellibranchiate mollusks of family

Common Shipworm (*Teredo navalis*).

Pholadidæ; very much elongated, and worm-shaped; mouth very delicate, open in front and at its lower part for the passage of the short foot; shell rather thick, equivalve, destitute of hinge, gaping at both ends. The species are numerous, and are generally known as SHIPWORM or PILEWORM, because they perforate and live in timber. Their perforations are in the direction of the grain of the timber, except when a knot is met, or the shell of another *Teredo*, when they accommodate themselves by bending;

the cavity is lined with calcareous incrustation. The aperture by which the T. enters is small, and it grows within the cavity which it makes. Two small valves form the true bivalve shell; the calcareous tube incloses the worm-shaped body of the animal. Its growth is very rapid, and its ravages are often terrible. A piece of deal has been found riddled by shipworms after 40 days' immersion. Ships, piles, and all submarine wood-work are destroyed by it. Copper-sheathing is employed to protect ships from the shipworm, or the timber is driven full of short broad-headed nails, the rusting of which forms a coating which it does not penetrate. The dikes of Holland have been threatened with destruction by its ravages. The COMMON SHIPWORM (*T. navalis*), said to have been introduced from warmer seas, is now extremely abundant in European seas; and *T. megotara* in the Atlantic extends from Mass. to S. C. In the E. Indies, a very large species (*T. gigantea*) is found, generally in shallow water among mangrove-trees; it is sometimes more than 5 ft. in length, and at the thickest part three inches in diameter.

TEREK, *tā-rĕk':* river of the Caucasus, rising about 8,000 ft. above sea-level, in a glacier near the lofty Mt. Kasbec (about 17,000 ft. high). It flows n.w. through the defiles of the mountains, crossing the dist. of the Kabarda, and reaches the border of the govt. of Stavropol, where it curves e., forming the s. boundary of that govt., until, reaching Kisliar, it divides into numerous branches, which form a delta 70 m. broad, and 50 m. long from apex to base, and enters the Caspian Sea. It is not navigable. In 53 m. it falls nearly 6,000 ft. Total length estimated 300 to 390 miles.

TERENCE, *tĕr'ĕnss* (PUBLIUS TERENTIUS AFER, *pŭb'lĭ-ŭs tē-rĕn'shĭ-ŭs ā'fĕr*): Roman comic poet: B.C. 185 (?)—B.C. 159; said to have been b. at Carthage. By birth or purchase, he is reputed to have become the slave of the Roman senator P. Terentius Lucanus, who, out of regard to his handsome person and unusual talents, educated him highly, and finally manumitted him. On his manumission, he assumed, of course, his patron's *nomen*, Terentius. His talent was precocious; and his first play was the *Andria*, written about B.C. 166. Its success was immediate, and introduced its author to the most refined society of Rome, where his engaging address and accomplishments made him a favorite. His chief patrons were Lælius and the younger Scipio, after living with whom in great intimacy in Rome, he went to Greece, where he translated 108 of Menander's comedies. He never returned; and accounts as to the place and mode of his death are conflicting. Six comedies are extant under the name of T., which are perhaps all he produced—viz., *Andria*, *Hecyra*, *Heautontimoroumenos*, *Eunuchus*, *Phormio*, and *Adelphi*. T. reproduced the manners and modes of thought presented by the writers of the New Comedy of Athens a century before his time. Thus he can scarcely be deemed a creative genius; but his artistic and critical genius is certainly of the highest order. In conjunction with Plautus, T., on

the revival of letters, was studied as a model by the most accomplished play-writers. His language is pure almost to being immaculate; and though inferior to Plautus in comic power, he is more than his match in consistency of plot and character, in tenderness, in wit, and in metrical skill. His plays have an educational value, as dividing, with the works of Cicero and Cæsar, the honor of being written in the purest Latin. They have been translated into most of the European languages. The best editions of his works are those of Bentley (1726); Davies; Wagner (London 1869); and Umpfenbach (Berlin 1870).

TERESA (or THERESA), *tē-rē'sa* or *tā-rā'sâ*, SAINT: one of the most remarkable of the female saints of the modern Roman calendar, and the most admired of the modern mystic writers of that communion: 1515, Mar. 28—1582, Sep. 29; b. Avila, in Old Castile; daughter of Alfonso, of the noble House of Sanchez de Ceyeda. She inherited from her mother delicate health and a most susceptible imagination; and as a child, she was remarkable for enthusiastic piety; and when she was but seven years old, she and her little brother, Rodrigo, fled from her father's house, with the design of offering themselves for the crown of martyrdom among the Moors, but were overtaken, and restored to their parents. Her mother died while T. was young, and for a time she engaged in the common vanities of her age, till she was sent for education to a convent at Avila, from which, however, she was compelled by illness to return home in her 16th year. During her illness, she resolved, notwithstanding the very earnest opposition of her father, to become a nun; and having in her 18th year entered a convent of the Carmelite order in her native city, she made her solemn vow 1534, Nov. 3. In this convent she remained nearly 30 years, but it was not till about the year 1539 that her constitution became strong enough to permit her to follow, even in an imperfect way, the observances of conventual life. Her own account of her mental and spiritual condition during this period, which extended to 1554, is extremely interesting; and, like the confessions of St. Augustine and other saints, has furnished endless materials to the spiritualists of later times. The change of heart and of purpose, known as her conversion, was in 1554, and was as complete and decisive as her former condition had been purposeless or fluctuating. It was occasioned by her father's death, which aroused her to serious thought, in which mood one day entering the oratory, she fell entranced before the image of the bleeding Christ. After a time, her religious exercises reached an extraordinary degree of asceticism. Her prayers were almost continual, and she was reported to be favored with visions, ecstasies, and other supernatural visitations, of which many curious details are related by her biographers and in her own letters and papers. The fame of her sanctity spread throughout Spain, and into other lands. By some the reality of the reported supernatural favors ascribed to her was questioned; and there were even some who threatened to invoke the rigorous investigation of the Inquisition; but the popular cre-

dence was freely accorded to her, and the authority of St. Francis Borgia, St. Peter of Alcantara, and other high names, eventually disarmed the opposition. The most notable and permanent fruit of the enthusiastic spirituality of T. is the reform of the Carmelite order, of which she became the instrument. She began this work in concert with a few zealous members of her own sisterhood in the convent at Avila, where she had resided from the date of her profession; but 1562 she obtained permission from the Holy See, under direction of Peter of Alcantara, to remove with her little community to St. Joseph's, a small and very humble convent in the same city, where she established in its full rigor the ancient Carmelite rule, as approved by Innocent IV. 1247, with additional observances introduced by T. herself. About the beginning of 1563, T. took up her abode therein; and 1565 she obtained from Pope Pius IV. a formal approval for the rule as modified by her. For two years, T. lived in great privacy in her little convent of St. Joseph; but 1567 the general of the Carmelite order, F. Rubeo, visited her convent and gave her permission to found other houses under the reformed discipline, for women and for men. T. entered on the work of reform with such energy, that strong opposition was aroused, and the general of the order 1575 procured from the pope a bull prohibiting further establishment of the reformed houses. But after a fierce struggle, she overcame; and in 1579 the Carmelites of the stricter observance established by T. were released from the jurisdiction of the old superiors, and united into a distinct association, with a separate head and a distinct organization, which was approved 1580 by Pope Gregory XIII. Under this new constitution, the association flourished and extended; and within the lifetime of T., no fewer than 17 convents of women and 16 of men accepted her reforms. T. died at Alba, and was canonized by Gregory XV. 1621, her feast being assigned to Oct. 15. She left a number of works, which have at all times had high reputation among the spiritualists of her own church, and whose merits, in many respects, are acknowledged by Prot. writers. They consist of ascetical and mystical treatises, instructions in the conventual life, meditations, etc., besides numerous letters of remarkable literary merit, independent of their doctrinal character. All her writings are characterized by a singularly exalted mysticism (see MYSTICISM). Her works in the original Spanish fill two folio vols., and they have been in whole or in part translated into almost every European language. Her life occupies nearly an entire volume of the new continuation of the *Acta Sanctorum;* and several more popular biographies have been written in Spanish, French, Italian, German—the best known in English being by Canon Dalton (1851), Miss Trench (1875), and Father Coleridge, S.J.

TERETE, a. *tĕ-rēt'* [L. *teres* or *terĕtem*, rounded off—from *tero*, I rub]: in *bot.*, nearly cylindrical; having the transverse section nearly circular.

TERGEMINAL, a. *tĕr-jĕm'ĭ-năl*, or TERGEM'INATE, a. *-nāt*, and TERGEM'INOUS, a. *-nŭs* [L. *tergĕmĭnus*, threefold, triple—from *ter*, three times; *gemĭnus*, double]: thrice double; threefold; three-paired.

TERGIFEROUS, a. *tĕr-jĭf'ĕr-ŭs* [L. *tergum*, the back; *fero*, I bear]: in *bot.*, bearing on the back—applied to plants which bear their spores on the back of the leaves, as ferns.

TERGIVERSATION, n. *tĕr'jĭ-vĕr-sā'shŭn* [F. *tergiversation*—from L. *tergiversātiōnem*, a refusing, a shift—from *tergum*, the back; *versus*, turned, pp. of *vertĕrĕ*, to turn]: a shift: a subterfuge; an evasion; fickleness of conduct.

TERGUM, n. *tĕr'gŭm* [L. *tergum*, the back]: in *entom.*, the upper surface of the abdomen.

TERHUNE, *tĕr-hūn'*, MARY VIRGINIA (HAWES) (pen-name MARION HARLAND): author: b. Amelia co., Va., about 1830. She began writing for the papers when 14 years old; was married to Edward Payson T., D.D., 1856; and has been editor of *Babyhood* and *The Home-maker*, magazines. Her publications include: *Marrying Through Prudential Motives*, her first story; *Alone* (1853); *The Hidden Path* (1855); *Miriam* (1860); *Nemesis* (1860); *Husks* (1863); *Husbands and Homes* (1865); *Sunnybank* (1866); *Ruby's Husband* (1868); *At Last* (1870); *Eve's Daughters* (1881); *Judith* (1883); *A Gallant Fight* (1888); *With the Best Intentions* (1890); and *His Great Self* (1892). Other works are: *Common Sense in the Household* (1871); *Breakfast, Luncheon, and Tea* (1875); *The Dinner Year-book* (1878); and *Our Daughters, and What Shall We Do with Them?* (1880).

TERLIZZI, *tĕr-lĭt'sē:* flourishing, well-built town of Italy, province of Bari; 20 m. s.e. of Barletta, 8 m. from the Adriatic. It contains a cathedral, a parish church, and three convents. The almond-tree is extensively cultivated in the vicinity. Pop. (1881) 20,442.

TERM, n. *tĕrm* [F. *terme*—from L. *termĭnus*, a boundary: It. *termine*]: a boundary; a limit; the time for which a thing lasts; any limited time; a space or period to which a limit has been set, or in which something runs its course (see TERMS, below): in *logic*, the subject or predicate of a proposition; one of the three component parts of a proposition, each of which is used twice: a word or expression denoting something peculiar to an art or a science: in *alg.* or *arith.*, a member of a compound quantity: a word or expression in general: V. to name; to call; to denominate. TERM'ING, imp. TERMED, pp. *tĕrmd*. TERM'ER, n. *-ĕr*, one who travels to attend a court-term. TERM'LESS, a. *-lĕs*, boundless. TERM'LY, a. *-lĭ*, occurring every term: AD. term by term. TERMS, n. plu conditions, as in a contract or agreement; words or language, as in good *terms;* footing or relation, as on good *terms;* fees: in *law*, periods of the year during which the particular business in the superior law courts was transacted (see LAW-TERMS); also days on which rents are settled (see QUARTER-DAY). In colleges and universities in the United States, there are usually three terms beginning in Sep., Jan., and Apr., and called the

fall, winter, and spring terms respectively. To BRING TO TERMS, to cause to submit or agree. To EAT ONE'S TERMS, to eat the prescribed number of dinners in the hall of the society, required by the Inns of Court in London, England, as evidence that the prescribed course of study has been completed by those who desire to be called to the bar. To MAKE TERMS, to come to an agreement.—SYN. of 'term, n.': limit; boundary; bound; stipulation; condition; expression; word.

TERMAGANT, n. *tĕr'mă-gănt* [from *Termagant* or *Tervagant*, one of the supposed deities of the Mohammedans, represented in old plays as a personage of a most violent character: comp. It. *Termegisto*, the child of thunder, a great quarrelling boaster]: a boisterous bold woman; a virago: ADJ. turbulent; boisterous or furious; quarrelsome; scolding. TER'MAGANTLY, ad. *-lĭ*. TER'MAGANCY, n. *-găn-sĭ*, the state or quality of being termagant. *Note.*—The Persian is said to be *tir-magian*, 'magian lord or deity.' The word was probably introduced by the Crusaders from the East, and confused, and made a personage co-equal with Mahound or Mahomet, and a god. The personage appeared on the stage in eastern flowing robes, and so in the popular speech the word was transferred to a woman.

TERMES, n. *tĕr'mēz*, or TER'MITE, n. *-mīt*, TERMITES, n. plu. *tĕr'mīts* [L. *termēs*, a wood-worm]: genus of ants found mostly within the tropics, and very destructive to trees and the wood-work of houses; the white ants (see TERMITES).

TERMINABLE, a. *tĕrm'ĭ-nă-bl* [L. *termĭnus*, a boundary (see TERMINATE)]: that may be bounded or terminated; coming to an end after a certain time. TERM'INABLY, ad. *-blĭ*. TERM'INABLENESS, n. *-bl-nĕs*, the state of being terminable. TERM'INAL, a. *-năl*, forming the extremity; situated at the end; in *bot.*, growing at the end of a branch or stem: N. that which ends; the end; the extremity. TERM'INALLY, ad. *-lĭ*. TERM'INIST, n. *-nĭst*, in *eccles. hist.*, one who maintains that God has assigned to every individual a certain term of repentance.

TERMINALIA, n. plu. *tĕrm'ĭ-nā'lĭ-ă* [L. *termĭnus*, a boundary, an end]: in *anc. Rome*, the annual festival of *Terminus* (q.v.), the god of boundaries: an interesting genus of plants, ord. *Combretăceæ*, so named from the crowding of the leaves in bunches at the ends of the branches; the species have generally astringent properties, some are used for dyeing and many for tanning: see MYROBALAN.

TERMINATE, v. *tĕrm'ĭ-nāt* [L. *terminātus*, pp. of *terminārĕ*, to bound, limit—from *termĭnus*, a boundary: It. *terminare:* F. *terminer*]: to bound; to limit; to put an end to; to finish; to come to an end; to be limited; to stop short; to conclude: ADJ. coming to an end; limited. TERM'INATING, imp. TERM'INATED, pp. TERM'INA'TION, n. *-nā'shŭn*, the act of limiting, setting bounds, or of bringing to an end; end in time or existence; conclusion; result; in *gram.*, the ending of a word; in *OE.*, a word; a term. TERM'INA'TIONAL, a. *-ăl*, pertaining to a termination; form-

ing the termination or end; arranged according to the terminations. TERM'INA'TIONALLY, ad. *-li.* TERM'INATIVE, a. *-nā-tĭv,* directing termination; absolute. TERM'INATIVELY, ad. *-lĭ.* TERM'INATOR, n. *-tĕr,* the dividing line between the enlightened and the unenlightened part of the moon. TERM'INATORY, a. *-tĕr-ĭ,* bounding; limiting.

TERMINI, *tĕr'mī-nē* (anc. *Thermæ Himærenses*): seaport town on the n. coast of Sicily, 21 m. e.s.e. of Palermo, at the mouth of the river Termini. It is built partly on a plateau (whose highest level is crowned by a castle—now a prison—of mediæval construction), and partly on the slope and in the hollow below. T., with its noble background of towering hills, and its magnificent view of the Mediterranean, well deserves the title *La Splendidissima,* bestowed on it by Emperor Frederick II. Many of the inhabitants are engaged in fishing for tunny and anchovies.—Pop. about 23,000.

The ancient *Thermæ* (of which T. is an Italian corruption) was founded B.C. 408, after the destruction of the Greek city of Himæra, whence its name Himærenses. Whether it owed its origin to the Carthaginians, or to the surviving citizens of Himæra, is doubtful; but it soon passed under the authority of the former, who here defeated the Romans with heavy loss B.C. 260 during the first Punic war. After Sicily became a Roman province, Thermæ was treated with peculiar consideration by its new masters, and became a flourishing place. Relics of the ancient city, e.g., the baths (which are still used), fragments of a theatre, and aqueduct, are visible; and numerous inscriptions, etc., are preserved in public and private collections.—See B. Romano's *Antichità Termitane* (Palermo 1838).

TERMINISM, n. *tĕr'mĭn-ĭzm* [Ger. and mod. L. *terminismus*—from L. *terminus*]: in *chh. hist.*, doctrine (advocated by some in the 17th c.) that there is a terminus in each man's life after which he is no longer capable of receiving grace or pardon of sins.

TERMINOLOGY, n. *tĕrm'ĭ-nŏl'ŏ-jĭ* [L. *termĭnus,* an end; Gr. *logos,* a discourse]: that branch of a science or art which defines and explains the peculiar words and phrases used in it; the words and phrases used in a science or art; also TERMONOLOGY, n. *tĕrm'ō-nŏl'ŏ-jĭ* [Gr. *termōn* or *termŏna,* an end; *logos,* a discourse]. TERM'INOLOG'ICAL, a. *-ĭ-kăl,* pertaining to terminology. TERMINOLOGICALLY, ad. *tĕrm'-ĭ-nō-lŏj'ĭ-kăl-lĭ.*

TERMINUS, n. *tĕrm'ĭ-nŭs,* TERM'INI, n. plu. *-nī* [L. *terminus,* a boundary, a limit]: boundary-stone: the first or last station of a railway. TERMINUS, the Roman god of public and private boundaries—originally apparently identical with Jupiter himself, but gradually recognized as a distinct deity. Such a god was a characteristic conception of the legal and land-loving Roman mind.

TERMITES: genus of insects of order *Neuroptera*, and family *Termitidæ;* characterized by large, round head, two ocelli, the small prothorax cordate, and feet-cushions lacking. The termites live in great communities, chiefly in tropical countries, and are almost omnivorous, in the larva, and pupa, as well as in the perfect state. In their communities there are five classes—males, females, workers, neuters, and soldiers. The workers, neuters, and soldiers all seem imperfectly developed females. The males and perfect females have four wings, which are long and nearly equal, and which are often suddenly cast off before the termination of their life; but the greater part of the community consists of workers, which are wingless. The 'soldiers' are larger than the neuters, and have very large mandibles, which they are always ready to use upon any assault. Most of the white ants make their nests on the ground, but some of them among branches of trees, decayed or dry wood forming a principal article of their food. The species which make their nests on the ground make them conical, or turret-shaped, often 12 ft., and sometimes even 30 ft. high, in groups, like a little village. The soil where the white ants have labored is particularly good, and the s. Africans take advantage of its excellent quality. The nest is divided internally into numerous chambers and galleries; there are generally two or three roofs within the dome-shaped interior, and the thick walls are perforated by passages leading to the nurseries and magazines of food. If a breach is made in the building, the soldiers appear, ready for defense. White ants are very useful in consuming every kind of decaying animal or vegetable matter. They even eat grass, and the snapping of multitudinous mandibles has been likened to the sound of a gentle wind among trees. They sometimes attack the wood-work of houses, and soon reduce the thickest timbers to a mere shell. Extraordinary and incredible stories are told of their attacking and devouring large animals, but it seems probable that they do so only when the animals are helpless from age or sickness. They come in vast hosts to any place where food is to be found, and are not easily driven off; multitudes pressing on, though previous multitudes have been destroyed. They gather great stores of corn into their nests, of which the natives of Africa often avail themselves. They are themselves also eaten in Africa, and are said to be delicate and pleasant food. The abdomen of the pregnant female T. becomes dilated to an extraordinary degree, so as to exceed the rest of her body 1,500 or 2,000 times, and she is then about 1,000 times heavier than the male insect. Her fecundity is prodigious; she is supposed to lay more than 31,000,000 of eggs in a year.

The T. which live in trees construct nests of great size, like sugar-casks, of particles of gnawed wood, cemented by a kind of gluten, and so strongly attached to the branches as not to be shaken down even by violent storms. These species sometimes take up their abode in the roofs

of houses, where they are very destructive to the wood work.

T. mordax and *T. atrox* are among the African ground-building species. *T. lucifugus* is found in s. Europe, and has proved very destructive in the navy-yard of Rochefort, and elsewhere in s. France. Sulphurous gases and chlorine are forced into its galleries, without completely effecting its extirpation. *T. flavicollis* is very injurious to olive trees in Spain. *T. flavipes* is a N. Amer. species which often inflicts much damage, especially in the s. U. S. *Psocus pulsatorius*, a Brit. species, one of the Termitidæ, is one of the class of insects in houses, which emit a sound like the ticking of a watch. The species of the genus *Psocus* are very small, active insects, living beneath the bark of trees, in wood, straw, etc.—In books of travels the T. are often called ants, their habits being similar, though they belong to a different order of insects.

TERN, a. *tĕrn* [L. *terni*, three each—from *ter*, thrice]: chiefly in *bot.*, threefold; consisting of three: N. what is composed of three things or numbers. TERNARY, a. *tĕr'-nĕr-ĭ*, proceeding by threes; consisting of threes; arranged in threes: N. the number three; also TER'NION, n. *-nĭ-ŏn*. TER'NATE, a. *-nāt*, in *bot.*, composed of three leaflets, as compound leaves. TERNARY COMPOUND, a substance consisting of the three elements, carbon, hydrogen, and oxygen, characteristic of plants.

TERN, n. *tĕrn* [Dan. *terne;* Sw. *tärna;* Icel. *therna*, the sea-swallow]: long-winged aquatic fowl, resembling gulls; a member of the genus *Sterna* and family *Laridæ;* but smaller and more slender than the gull; feet small; wings long and pointed; tail usually long and forked. The plumage is very full. From their forked tail, manner of flight, and small size, the terns are often called sea-swallows. They are incessantly on the wing, skimming the surface of the water, and catching small fishes and other small animals from it. The species are numerous, 50–75, and are found in almost all parts of the world: some are of very wide geographic distribution. Many are birds of passage. Thus, all which occur in n. parts of the world are mere summer visitants. The COMMON T. (*Sterna hirundo*) is abundant on s. shores of Britain, rarer in the n.; it closely resembles our common Forster's T.; but the name Common T. is applied to a number of species. WILSON'S T. (*S. Wilsoni*), of our Atlantic coast, is popularly called the Mackerel Gull from its supposed appearance about the time that mackerel are first taken.

TERNANT, *tĕr-nong'*, JEAN DE, Chevalier: about 1750–1816; b. Sez, Normandy. He came to this country with Baron Steuben, and served in the army during the revolution. In 1778, Apr., he was commissioned maj., and appointed sub-inspector in Steuben's division; 1778, Sep., he was made lieut.col. and inspector of the army in Ga. and S. C. In 1780 he was taken prisoner at Charleston, but soon exchanged, and 1781 was engaged at the siege of Yorktown. At the close of the revolution he returned to

France, re-entered the French army, and rose to the rank of col. 1790–1803 he was ambassador to the United States. He died at Couches, Normandy.

TERNATE, *tĕr-nāt'* or *tĕr-nā'tā:* island in the E. Indian archipelago: see MOLUCCAS.

TERNAY, *tĕr-nā'*, CHARLES LOUIS D'ARSAC DE: French naval officer: 1722–1780; b. Laudun, France. He entered the French naval school 1738. In 1757 he served at the siege of Louisburg, and subsequently commanded a division of gun-boats on the St. Lawrence. In 1762 he was in command of a squadron sent against Newfoundland. He landed at St. John June 2, and soon afterward captured it, with several British merchant vessels; 1772–79 was gov. of the island of Bourbon; 1780 commanded the fleet which brought Count Rochambeau and his army to the aid of the colonies. T. died at Newport.

TERNI, *tĕr'nē* (anc. *Interamna*): town of central Italy, prov. of Perugia; on the right bank of the Nera (anc. *Nar*), a little below its confluence with the Velino; 49 m. n.n.e. of Rome. It is encircled by a wall, with towers and five gates; is well built; gives name to an archbishopric; and possesses a cathedral, several fine palaces and churches, a hospital, theatre, and various monuments of antiquity, as the ruins of an amphitheatre, temples, and baths. T. manufactures silk and woolen fabrics. About two m. from the town is the famous cataract of Velino, about 650 ft. high (in three falls—65 ft., 330 ft., and 190 ft.), celebrated by Byron in *Childe Harold.*—Pop. (1881) 9,415.

Ancient *Interamna*, according to classic tradition, was founded only 80 years after Rome, but we have no knowledge of its history until it ceased to be an Umbrian, and became a Roman city. About the time of Marius and Sulla, it was (according to Florus) one of the *florentissima Italiæ municipia*, but at no period very prominent.

TERNSTRŒMIACEÆ, *tĕrn-strē-mĭ-ā'sē-ē:* natural order of exogenous plants, allied to *Guttiferæ*, and consisting of trees and shrubs, natives of warm and temperate countries. About 150 species are known. They are most abundant in S. America; a few are found in N. America; some in India, China, and other parts of the East; only one African species is known; and Europe produces none. The leaves are alternate, leathery, in many species evergreen, generally undivided, sometimes dotted. The flowers are on axillary or terminal stalks, generally white, sometimes pink or red; with 5–7 concave, leathery, deciduous sepals, and 5–9 petals which are often combined at the base; many hypogynous stamens, either free or variously combined; 2–7 filiform styles, more or less combined; the fruit a 2–7-celled capsule, either opening by valves, or leathery and indehiscent, the seeds large, few, and attached to the axis, the cotyledons very large, often containing much oil. This order is very important as containing the Tea-shrubs. It is also interesting for the great beauty of the foliage and flowers of many species, of which the genus *Camellia* affords the best-known examples. See TEA: CAMELLIA: GORDONIA.

TERPENES, n. *tĕr-pē'nēz* [see TEREBINTH]: the class of volatile oily bodies of which turpentine is most important.

TERPSICHORE, n. *tĕrp-sĭk'ŏ-rē* [Gr. *Terpsichŏrē*—from *terpein*, to enjoy; *choros*, dancing]: in *anc. Gr. myth.*, that one of the nine muses who presided over choral song and the dance. TERPSICHOREAN, a. *tĕrp'sĭk-ō-rē'ăn*, pertaining to the muse who presided over dancing.

TERRA, n. *tĕr'rā* [L. and It. *terra*, earth, clay: Gael. *tir*, land, earth]: the earth; earth; clay. TER'RA COT'TA, *kŏt'tā* [It., baked clay]: kind of fine clay formed into works of art, which are afterward burned in the same manner as bricks—anciently used for portable statues: the Greek terra-cotta figures are the materials of a very interesting branch of archeology recently largely developed.—The term is now applied chiefly to manufactures of brick-earth for ornamental—especially architectural—purposes. About the beginning of the 18th c., it was common in Brit. architecture; but after the reign of Queen Anne, its use was discontinued. A complete revival has now taken place, and this material has been applied with admirable effect in numerous buildings of great size and fine design. TER'RA FIR'MA, *fĕr'mā* [L. *firma*, solid, stable]: solid earth, as opposed to water; dry land; sometimes denoting continental land as distinguished from islands (see below). TER'RA INCOG'NITA, *ĭn-kŏg'nĭ-tā* [L. *incognita*, unknown]: unknown or unexplored land. TER'RA JAPON'ICA, *jŭ-pŏn'ĭ-kā* [L., Japanese earth]: same as *catechu*, a substance obtained from the juice of a species of acacia, formerly supposed to be a kind of earth from Japan: see CATECHU. TER'RA LEM'NIA, *lĕm'nĭ-ā* [L., Lemnian earth]: a medicinal earth, soap-like and detergent. TER'RA PONDERO'SA, *pŏn'dĕr-ō'sā* [L., heavy earth]: barytes or heavy spar. TER'RA DI SIEN'NA, *sī-ĕn'nā* [It., earth from Sienna]: a ferruginous ochreous earth used as a pigment in both oil and water-color painting, when burnt becoming of a deep-orange tint (see BURNT SIENNA). TER'RA VER'DE, *vĕr'dē* [It., green earth]: native green earth, found at Verona and in Cyprus, used as a pigment in painting.

TERRA, *tĕr'rā*, or TELLUS, *tĕl'ŭs:* in *Rom. myth.*, one of the oldest of the deities, the goddess of earth, corresponding to Gē of the Greek mythology. She was the wife of Uranus, and mother of Oceanus, the Titans, Giants, and Cyclops. Her festival was celebrated April 15, though offerings were made to her at every seed-time and harvest. Her worship was almost universal; temples, altars, and statues being erected in her honor in nearly every country. She is identical with Cybele.

TERRACE, n. *tĕr'rās* [F. *terrasse*, a terrace—from It. *terrazza*, an open walk—from L. *terra*, earth: Sp. *terrasa*, a terrace]: a raised bank or platform of earth, either natural or artificial; any shelf or bank of land having a uniformly flat or level surface; any flat work or place raised above the ground; an open gallery; the flat roof of a house; a name given to a row of houses: V. to form into a terrace. TER'RACING, imp. TER'RACED, pp. *-rāst:* ADJ. formed into a terrace; having a terrace.

TERRACINA, *tĕr-râ-chē'nâ* (anc. *Tarracina*): town of central Italy, in the prov. of Rome, on the coast at the s.e. extremity of the Pontine Marshes, near the mouths of the Ufente and Amaseno; about 60 m. s.e. of Rome. It is the seat of a bishop; possesses a cathedral (built probably on the ruins of a heathen temple), a square with a handsome fountain, a palace of Pius VI., and, on the summit of a precipice overlooking the town, the ruins of a palace of Theodoric, King of the Goths. The harbor, a naval station of the Romans, is now filled up.—Pop. (1881) 6,294.

Tarracina was originally a Volscian town, and was called by the Volscians *Anxur*, a name often applied to it by the Latin poets. It fell into the hands of the Romans B.C. 400, became the seat of a Roman colony B.C. 329, and as long as the republic and empire lasted was flourishing and important. So closely do the mountains here approach the sea, that there was scarcely room for the celebrated 'Appian Way;' hence the importance of T. as a military position. Numerous ruins of the ancient town are visible.

TERRA DEL FUEGO, *tĕr'râ dĕl fwā'gō*, correctly, Tierra del Fuego (q.v.).

TER'RA DI LAVORO, *dē lâ-vō'rō* (*Campania Felix*), now CASERTA: maritime province of s. Italy, bounded n.w. by the former Papal States; 2,326 sq. m. This is the famous *Campania Felix* of the ancients. Pliny extols its beauty and its fine situation. Florus calls it the finest country in the world. In ancient times, it was inhabited by the Ausonii, the Osci, and later by the Campani. The finest part of Campania has been separated from it, and is that fertile tract which surrounds the Gulf of Naples like an amphitheatre; another part has been added to the province of Molise. T. di L. is watered by two rivers, the Liris or Garigliano and the Volturno. Toward the e. it is broken up by the Apennines; and its beautiful ranges of hills are clothed with vine and olive yards, and studded with country-seats. It produces corn, strong wines, oil, fruits, and silk. Its seaport-towns are populous and busy, though here and there the sea-board presents marshes. The climate is very mild in winter, and extremely hot in summer. Pop. (1881) 714,487; (1901) 785,357.

TER'RA FIRMA, *-fĕr'mâ:* term specifically applied in geog. to two different regions: 1st, All the mainland of Italy which acknowledged the supremacy of Venice—viz., the duchy of Venice, Venetian Lombardy, the March of Treviso, the duchy of Friuli and Istria. 2d, Extensive tract of S. America, bounded by the Pacific Ocean, Peru, the silvas of the Amazon, the Atlantic Ocean, and the Isthmus of Panama—mostly belonging to the Spaniards during the 18th c.: in a still more restricted sense, the term was applied by the Spaniards to the Isthmus of Panama itself.

TERRANOVA, *tĕr-rȧ-nō'vȧ*, or TERRANUOVA, *-nô-ō'vȧ:* seaport-town on the s. coast of Sicily, province of Caltanisetta; on the right bank of the Omonimo, 18 m. e. from Alicata. There is no regular port, but the town has good trade in fruit, corn, pulse, sulphur, soda, and above all, in cotton, large quantities of which are grown in the vicinity. A kind of coarse cloth is manufactured for home consumption. T. is believed to occupy the site of anc. Gela (q.v.). The town now standing was built by Frederick II. 12th c. In its neighborhood is the village of Mazarino, from which the famous cardinal took his name. —Pop. (1881) 16,440.

TERRAPIN, n. *tĕr'rȧ-pĭn*, or TER'RAPENE, n. *-pēn:* large kind of turtle, living in tidal water, highly valued as delicious food. The name is popularly given to many species of turtles (see TURTLE: TORTOISE), of the family *Emydæ* (see EMYS), natives of tropical and warmer temperate countries. The neck can be wholly retracted within the shell; the head is flat, and the jaws prolonged into a beak. They feed partly on vegetable food, also on fish, reptiles, and other aquatic animals. They swim very well, and even on land move with much more swiftness than land-tortoises. Several species are natives of N. America.

TERRAQUEOUS, a. *tĕr-rā'kwĕ-ŭs* [L. *terra*, earth; *aqua*, water]: consisting of land and water, as the surface of the earth or globe.

TERRE, n. *tĕr* [F. *terre*, earth—from L. *terra*, earth]. TERRE-BLUE, *tĕr'-blô*, a kind of earth of a blue color. TERRE-PLAIN, *-plān*, less correctly TERRE-PLEIN [F. *plain*, flat—from L. *plānus*, even, level]: in *fort.*, the level terrace of the rampart, 25 to 40 ft. wide, on whose front portion the parapet and banquette are formed (the cannon being mounted on the parapet), while its rear slopes downward to the general level of the inclosure; also, the natural ground on which a gun stands.

TERREEN, n. *tĕr-rēn':* another spelling of TUREEN.

TERRE HAUTE, *tĕr'rĕh hōt:* city, cap. of Vigo co., Ind.: on the Wabash river and the Wabash and Erie canal, and on the Chicago and Eastern Illinois, the Cleveland Cincinnati Chicago and St. Louis, the Evansville and Terre Haute, the Terre Haute and Peoria, and the Vandalia Line railroads; 73 m. w. of Indianapolis; equidistant from Chicago, Cincinnati, and St. Louis; 5 sq. m. It is laid out in rectangular form on a bluff on the e. bank of the river, 60 ft. above high water; is underlaid with semi-block and bituminous coal; and is 12 m. from the great block coal mines of Clay co. The vicinity has also large agricultural worth. The abundance and proximity of coal and the exceptional railroad and water communications have given T. H. high rank as a manufacturing and shipping city. The streets are broad and inviting; there are natural and manufactured gas and electric light plants; the water-works system has been improved recently at a cost of $300,000; and the drainage is thorough. The city contains new co. court-house (cost $500,000), city-hall,

Providence Hospital, Indiana State Normal School, Rose Polytechnic Institute (endowment $610,000), Rose Orphan Home (liberally endowed), Coates College, opera-house, 35 churches, 21 public-school buildings, public library, 3 national banks (cap. $650,000), 2 private banks, 1 savings bank; and 4 daily, 5 weekly, and 2 monthly periodicals. In 1890 the net public debt was $307,000; valuation of real property $14,700,000; personal $6,500,000; tax rate $1.20 on $100. In 1902 the bonded debt was $331,000 and the ass'd val. $20,920,685. The manufacturing industries include iron, nail, and car works; steam-engines; hominy-mills, the largest in the world; blast-furnaces; rolling-mills; brick-yards; flour-mills; iron-foundries; machine shops; agricultural-implement works; and distillery; and there are 3 petroleum wells, and a magnetic artesian well, whose waters have high medicinal properties.—T. H. was laid out 1816 in what was known as the Fort Harrison prairie, and chartered as a city 1853. In 1880 it ranked 3 city in the state in pop., and 1900 the 4th. Pop. (1880) 26,042; (1890) 30,217; (1900) 36,673.

TERRELL, *tĕr'ĕl:* city in Kaufman co., Tex.; on the Texas and Pacific and the Texas Central railroads; 32 m. e. of Dallas. It is in a fruit-raising and agricultural region, and has important dairy and cattle interests; contains 2 national banks (cap. $200,000), 1 private bank, Terrell Institute, 4 weekly newspapers, and public school property valued at $29,350; and (1890) had receipts and disbursements $8,906, and assessed valuation $875,018. Pop. (1880) 2,003; (1890) 2,988; (1900) 6,330.

TERRENE, a. *tĕr-rēn'* [L. *terra*, earth]: pertaining to the earth; earthy: N. in *OE.*, surface of the earth.

TERRESTRIAL, a. *tĕr-rĕs'trĭ-ăl* [L. *terres'tris*, belonging to the earth—from *terra*, the earth]: existing on the earth; pertaining to the world or the present state; mundane; opposed to *celestial:* N. an inhabitant of the earth. TERRES'TRIALLY, ad. *-lĭ.* TERRESTRIAL MAGNETISM, the magnetic force exerted by the earth: see MAGNETISM, TERRESTRIAL.

TERRESTRIAL TEMPERATURE: degree of the earth's sensible heat as measured by the thermometer. The distribution of heat over the globe is represented by isothermal lines, or lines drawn through all places having the same mean temperature: see ISOTHERMAL LINES. The mean annual temperature is shown by the lines in fig. 1, and the warmest and coldest months in fig. 2, the dotted lines showing the mean temperature for January, and the solid lines the temperature for July.

The part of the globe having the highest mean annual temperature forms an irregularly shaped belt along the equator, comprised between the n. and the s. isothermals of 80°. On either side of this warm belt the temperature diminishes toward the poles; and the lines showing successively this diminution are speaking in a very loose sense, arranged parallel to the equator, thus showing the predominating influence of the sun as the source of terrestrial heat. The coldest portion of the earth's surface is a small oval-shaped patch near to but not surrounding the n. pole, its mean temperature being −4°. Its narrowest diameter lies n. and s., nearly touching the pole on one side, and extending on the other as far s. as 72°·30 n. lat. in 130° w. long. Part of it is seen in the diagram. On looking at the isothermal of 0°, one might be led to suppose that there are two centres of greatest cold, one n. of Siberia, the other n. of Brit. America. This, however, is not the case—the apparent double centre of greatest cold being due solely to the isothermals being drawn on Mercator's projection of the earth; for if an isothermal map be drawn on a polar projection, the lines of mean annual temperature inclose one connected space of greatest cold, and not two such spaces, as is frequently supposed.

While the decrease of temperature in advancing toward the poles corresponds in a general way to what may be called the solar climate, there are deviations due to disturbing causes too important to be overlooked. These disturbing causes are (1) the currents of the sea; (2) the prevailing winds; (3) large surfaces of water which are frozen during part of the year.

The influence of an oceanic current depends on the temperature of the place whence it starts, or which it passes, and of the place at which it arrives. Hence the great equatorial current, flowing from e. to w., does not require to be considered here, because the heat remains the same throughout its course; but only those currents are here to be considered which convey the waters of the sea to higher or to lower latitudes. Of these, the most marked and important is the Gulf Stream in the n. Atlantic, which, by conveying warm water to the arctic regions, pushes the isothermals many degrees northward. There is a similar, though much feebler, current passing from the n. Pacific to the Arctic Sea through Behring Strait; there, accordingly, the isothermals are pushed a little northward. In the s. hemisphere there are two currents: one discovered by Humboldt, passing from the Antarctic Ocean northward by the coast of Peru as far as Lima; the

other flowing from the Cape of Good Hope northward along the w. coast of Africa: these currents, flowing from colder to warmer latitudes, lower the temperature, and thus drive the isothermals toward the equator. Again, the great equatorial current, after impinging on the e. coast of Africa, turns s., and, by the warmth that it imparts, pushes the isothermals into higher latitudes. For the same reason,

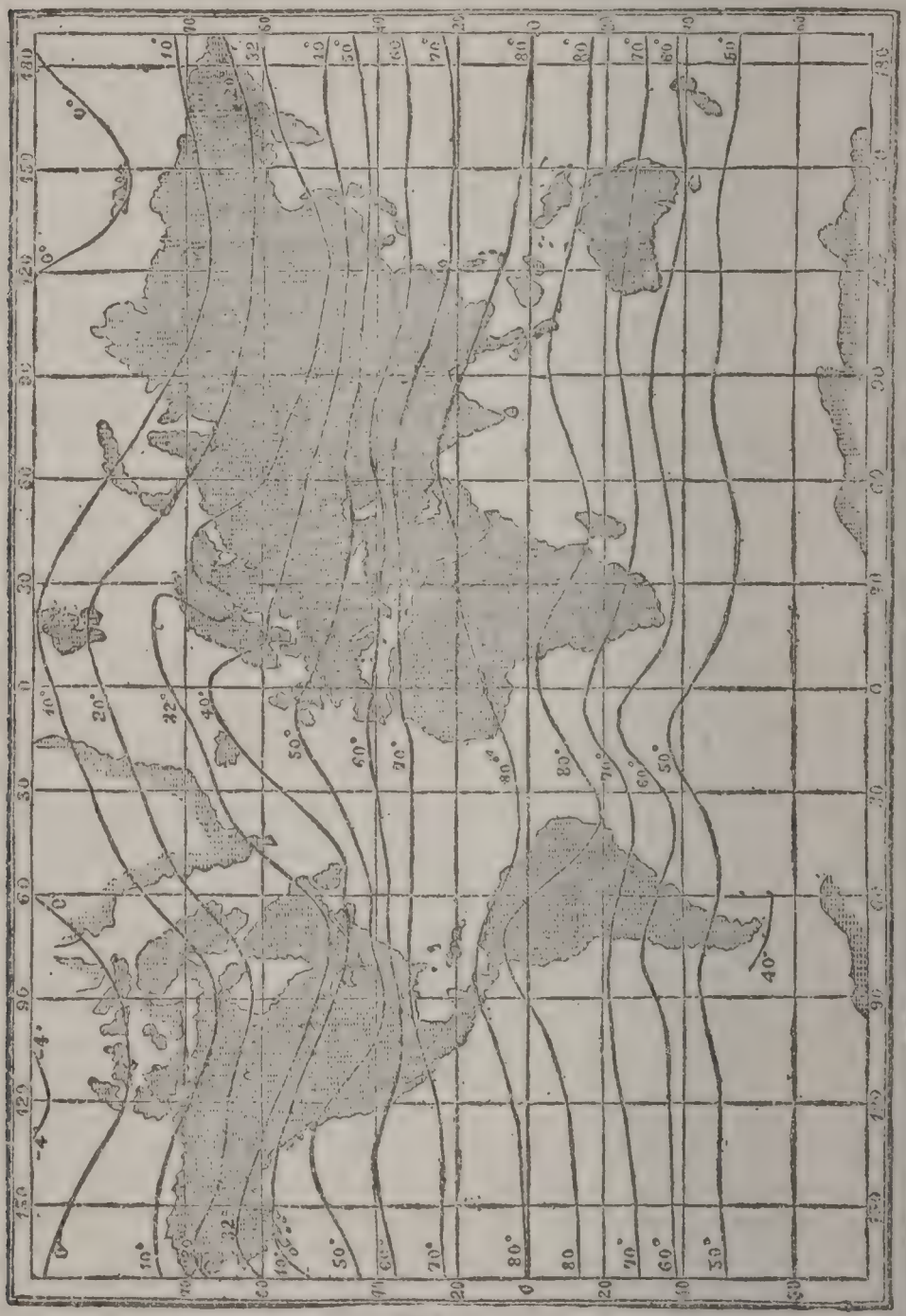


Fig. 1.

the current flowing s. past the coast of Brazil raises the temperature in the e. of that country. The influence of these great currents is more distinctly marked in the forms of the isothermals for Jan. and July. Thus, in Jan., when the relative excess of the temperature of the Gulf Stream is greatest, the isothermals are driven very far to the north; similarly, in the s. hemisphere, the currents from the Antarc-

tic Ocean being coldest in July, the isothermals during that month are deflected more toward the equator. The most remarkable lowering of the isothermals occurs in Labrador and Newfoundland during May and June, and is caused by the icebergs which then descend on these coasts from Davis's Strait.

Since winds bring the temperature of the regions that they have crossed, the equatorial current is a warm wind,

Fig. 2.

and the polar a cold wind; also winds arriving from the ocean are not subject to such variation of temperature during the year as winds from a continent. As an atmosphere loaded with vapor obstructs both solar and nocturnal radiation, it follows that moist winds are accompanied with a warm temperature in winter, and a cool temperature

in summer; and dry winds with cold winters and hot summers. The direction of mountain ranges also is an important element in estimating the influence of winds on temperature. These considerations explain the position of the isothermals in the n. temperate zone, where the prevailing wind is the s.w. or anti-trade (see WINDS). In Jan., the w. parts of each continent have a comparatively high temperature, from their proximity to the ocean, whose high temperature the winds waft thither; and they are further protected from extreme cold by their moist atmosphere and clouded skies. But in the interior of the continents it is otherwise; for the winds becoming colder as they advance, and being deprived of their moisture as they cross the mountains in the west, the soil is exposed to the full effects of radiation during the long winter nights, and, as a consequence, the temperature rapidly falls. In the centre of Siberia, the Jan. temperature falls to −40°, which is 9° colder than the coldest part of the Amer. continent; and this centre of greatest cold lies near the e. part of the continent of Asia. On the other hand, in July, the interior of continents is much warmer than their w. parts. Hence the interior and e. parts of Asia and and America are characterized by extreme climates, and the w. parts by equable climates. Thus, at Yakutsk, in Siberia, the July temperature is 62°·2, and the Jan. −43°·8, the difference being 106°·0; while at Dublin these are respectively 60°·8 and 38°·5, the difference being only 22°·3. This constitutes the most important distinction of climates, as respects both vegetable and animal life. On man especially the effect is very great—the severity of the strain of extreme climates on his system being shown by the rapidly increasing death-rate as the difference between the July and Jan. temperatures increases.

The great fresh-water lakes of N. America—Superior, Huron, Erie, Michigan, Ontario, Bear Lake, etc.—exercise important influence on the climate of central N. America; for in winter, America, with its frozen lakes, is an unbroken continental mass, and its winter climate is therefore continental; whereas in summer its numerous large sheets of fresh water communicate to large portions of it many of the features of an insular summer climate.

The whole effect of the disturbing causes is seen at once if we compare the observed temperature of a place with its normal temperature—i.e., the temperature due to it in respect of its latitude. In the n. hemisphere, in Jan., the sea and the w. parts of the continents are an excess of their normal temperature; elsewhere there is a deficiency. There are two centres of excess: one n.e. from Iceland, amounting to 41°; the other in Russian America, amounting only to 18°; and two centres where the temperature is deficient: one at Irkutsk, amounting to 41°; and the other w. of Hudson's Bay, amounting to 27°. In July the United States, Europe, Asia, the Indian Ocean, n. Africa, and the extreme n. of S. America have their temperature in excess, while elsewhere it is deficient. The centres of excess are n. of Siberia, 13°·5; Red Sea, 11°·0; and n.w. of

the United States, 4°·5: and the centres where the temperature is deficient are the entrance to Hudson's Bay, 11°·0; and the Aleutian Islands, 11°·0.

As to *underground temperature*, protracted investigation, involving data, widely differing, from very various deep mines and borings in remote parts of the earth, has led to the conclusion that a descent through 64 ft. through the crust of the earth corresponds to a rise of 1° Fahrenheit.

TERRET, n. *tĕr'rĕt*, or TERRIT, n. *tĕr'rĭt* [F. *touret*, a small wheel]: in *saddlery*, a ring attached to the pad or saddle and hames of harness, through which the driving-reins pass.

TERRIBLE, a. *tĕr'rĭ-bl* [F. *terrible*—from L. *terribĭlĭs*, frightful—from *terrĕō*, I frighten: It. *terribile*]: that excites or is fitted to inspire terror or dread; fearful; awful; *colloquially*, so great as to incommode or offend; very great. TER'RIBLY, ad. *-blĭ*, very much; exceedingly; very. TER'RIBLENESS, n. *-bl-nĭs*, the quality or state of being terrible; dreadfulness.—SYN. of 'terrible': frightful; dreadful; horrible; tremendous; terrific; horrid; formidable; shocking.

TERRIER, n. *tĕr'rĭ-ĕr* [F. *terrier*, a burrow—from F. *terre*; L. *terra*, the earth]: small rough-haired dog remarkable for vivacity and courage and for the eagerness with which it follows animals into their burrows or holes. It will readily attack animals much larger than itself. Terriers are of great use for killing rats: they are used also for driving the fox from his retreat; and a large variety, the *Saufinder*—i.e., Boar-seeker—is employed in Germany to rouse the fiercest beasts of the forests from their lairs. The varieties of T. are numerous. Two are widely known—Scotch and English terriers; the former with long, rough, wiry hair, with which even the face is much covered; latter with smooth, short hair. The ears are either erect and pointed, or have pendent tips. The Skye T. is a breed of Scotch T., peculiarly prized. Dogs very similar to the T. have existed in n. Europe in a domesticated state from remote antiquity. The Bull T. is probably a cross between the T. and the Bull-dog (q.v.).

TER'RIER [OF. *terrier*—from L. *terrarius*, of land, in *terrarius liber*, book of the land—from *terra*, land], in Feudal Law: description or enumeration of lands and tenements; survey or register of ecclesiastical lands, etc.

TERRIFY, v. *tĕr'rĭ-fī* [F. *terrifier*, to terrify—from L. *terrĕō*, I frighten; *facio*, I make]: to excite great fear or dread in; alarm or shock with fear. TER'RIFYING, imp.: ADJ. filling with fear or dread; frightening. TER'RIFIED, pp. *-fīd*. TERRIFIC, a. *tĕr-rĭf'ĭk*, causing or fitted to cause great dread; fearful; dreadful.

TERRIGENOUS, a. *tĕr-rĭj'ĕ-nŭs* [L. *terrigĕna*, born of the earth—from *terra*, earth; *gigno*, I beget]: produced by the earth: earth-born.

TERRITORIES, *tĕr'rĭ-tō-rĭz*, IN THE UNITED STATES administrative circumscriptions of regions under the jurisdiction of the United States that have not yet been admitted to the complete rights of state autonomy. A territory in the United States has its chief executive, administrative, and judicial officers named by the president. When 'organized,' a territory has a legislative body of limited powers, whose acts are subject to the approval of congress: its representative in congress is termed Delegate (q.v.). The organized T. (1963) were Oklahoma, Arizona, New Mexico, Hawaii and Porto Rico. Unorganized T. (no legislatures) are Alaska and Indian Territory.

TERRITORY, n. *tĕr'rĭ-tō-rĭ* [L. *territōrĭum*, domain, district—from *terra*, the earth: It. *territorio*: F. *territoire*] a district of country; a region; the whole extent of country subject to a state, city, or sovereign prince; any district or division (see TERRITORIES IN THE UNITED STATES). TER'RITO'RIAL, a. *-tō'rĭ-ăl* [F.—L.]: pertaining to a territory; limited to a certain district. TER'RITO'RIALLY, ad. *-lĭ*.

TERROR, n. *tĕr'rĕr* [F. *terreur*—from L. *terror*, great fear—from *terrĕō*, I frighten: It. *terrore*]: great fear, alarm; that agitates the body and mind; dread; consternation; a cause of extreme fear. TER'RORLESS, a. *-lĕs*, free from terror. TER'RORIZE, v. *-īz*, to fill with terror; control by terror; intimidate; appall. TER'RORISM, n. *-ĭzm*, a state of being terrified or put in bodily fear; government by terror. TER'RORIST, n. *-ĭst*, one who advocates terrorism; one of the extreme French revolutionists. REIGN OF TERROR (see under REIGN). TERROR-SMITTEN, a. overwhelmed with terror. KING OF TERRORS, death.—SYN. of 'terror': consternation; dread; dismay; alarm; fright; fear; trepidation; panic; apprehension.

TERRY, n. *tĕr'rĭ*: a fabric woven like velvet, but with the loops uncut.

TERRY, *tĕr'rĭ*, ALFRED HOWE: soldier: 1827, Nov. 10—1890, Dec. 16; b. Hartford, Conn. After a course in the Yale Law School, he began practice 1849, was clerk of the state superior and supreme courts 1854–60, and commanded a militia regt. At the opening of the civil war he was appointed col. of the 2d Conn. vols.; participated in the battle of Bull Run; organized the 7th Conn. vols. at the expiration of his short enlistment; and served in the S. C. campaign, having part in the capture of Ft. Pulaski, of which he was placed in command. Promoted to brig.gen. of vols., he was engaged in the operations against Charleston, led the expedition of Stone river, and, after the capture of Ft. Wagner, had charge of the n. district of the dept. of the South. In the Va. operations of 1864 he was commander of a division of the 10th army corps, was brevetted maj.gen. of vols., and engaged in the actions at Chester Station, Drewry's Bluffs, Bermuda Hundred, Fussell's Mills, Deep Bottom, the siege of Petersburg, and in the battle of Newmarket Heights. In 1865 he became still more distinguished as commander of land forces in the attack on Ft. Fisher, and

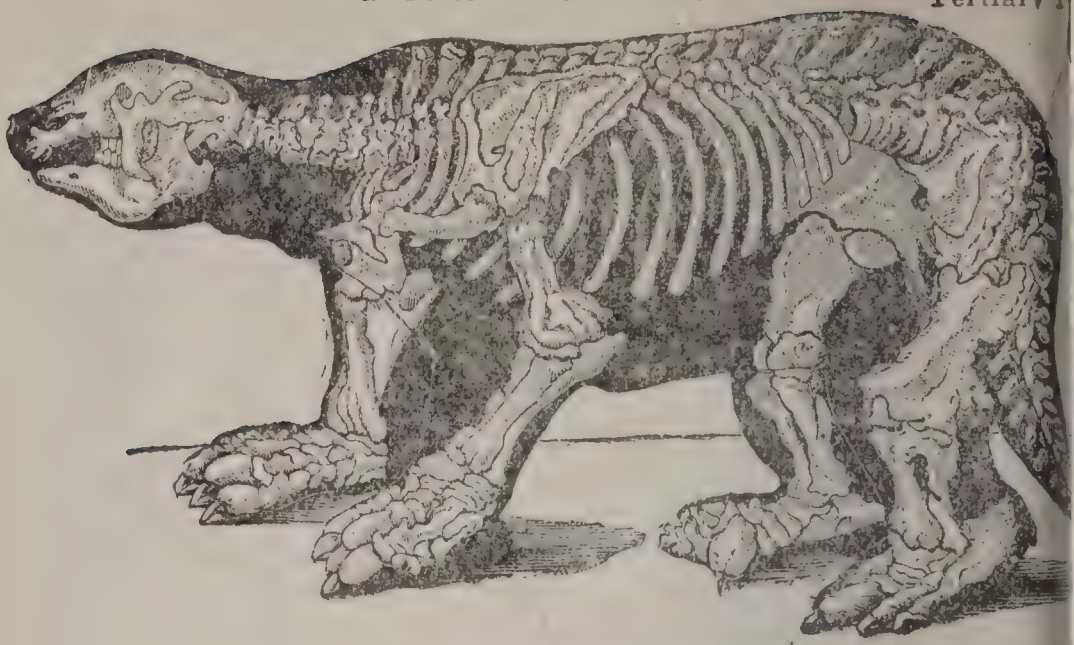
especially in the severe assault Jan. 15, resulting in the enemy's loss of 2,000 men captured, 500 killed and wounded, the abandonment of fortifications on Cape Fear river, and the seizure of a great quantity of arms, ammunition, and stores. For this he was promoted brig.gen. U. S. army and maj.gen. of vols., and received the thanks of congress. He was afterward active in the capture of Wilmington, N. C., and in the operations of Gen. Sherman. The month preceding the close of the war he was brevetted maj.gen. of the regular army, and promoted to that rank 1886. Before his retirement from service 1888, he commanded at various times the depts. of Va., Dak., the South, and last that of Mo. It was not known until recently that by high-minded silence, out of regard to the chivalrous Gen. Custer, he assumed responsibility for the disaster of that officer 1876, which resulted from disobedience to orders. Gen. Terry died in New Haven, Conn.

TER'RY, ELLEN ALICE: actor: b. Coventry, Eng., 1848, Feb. 27. She made her first appearance on the stage when 10 years old as Mamillius in *Winter's Tale*, at the Princess's Theatre, London, under the management of Mrs. Charles Kean; and then played at the Haymarket, Queen's, Olympic, Adelphi, and Holborn theatres till 1867, when she retired. In 1874 she reappeared at the Queen's as Philippa Chester in *The Wandering Heir;* 1875 played at the Prince of Wales's Theatre; 1876 created the principal part in Lord Lytton's *House of Darnley* at the Court Theatre; and since 1878 has been Henry Irving's principal support at his Lyceum Theatre, London, and in his tours of the United States (1883, 84, 86, and 88) and of Germany (1889). In Irving's revival of *King Henry VIII.* at the Lyceum Theatre 1892, Jan. 5, she appeared as Katharine of Aragon to his Cardinal Wolsey. She has been thrice married.

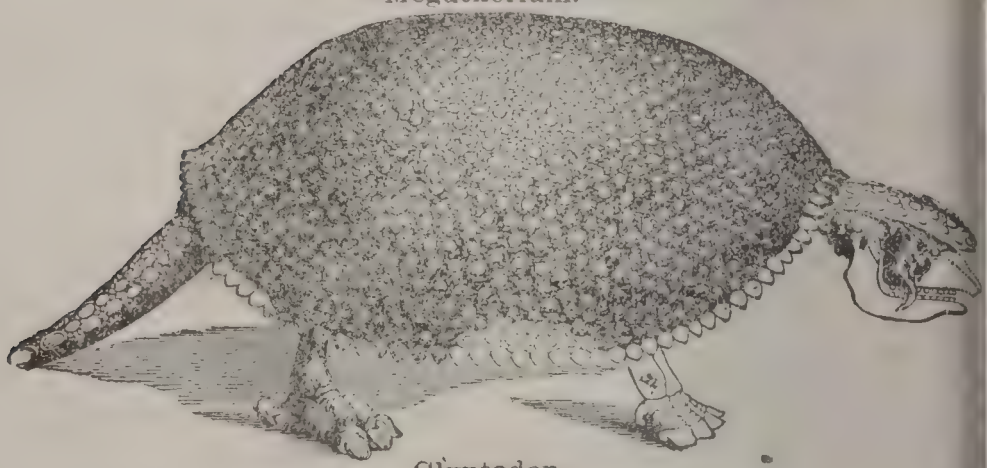
TERSANCTUS, n. *tĕr-săngk'tŭs* [L. *ter*, thrice; *sanctus*, holy]: the part of the thanksgiving introductory to the consecration prayer in the office for Holy Communion in the Church of Eng., which is preceded by Prefaces on the Great Festivals—so named from the threefold invocation of the Deity, Holy, Holy, Holy: also called *Sanctus* and *Seraphic Hymn;* sometimes incorrectly called Trisagion (q.v.).

TERSCHELLING, *tĕr-schĕl'lĭng:* one of the chain of islands n. of Holland, in 53° 24′ n. lat.; 45 sq. m. The principal villages are Oosterschelling, Westerschelling, and Midsland. T. consists of fertile arable and meadow lands; is protected on the s. by large dikes, and in other parts by downs, which are carefully preserved. There is a good haven, a ship-building yard, a woolen dyework, etc.—Pop. 3,128.

TERSE, a. *tĕrs* [L. *tersus*, wiped off, clean, pp. of *tergĕrĕ*, to wipe, to polish: It. *terso*]: clearly written; concise and expressive—applied to style or language; in *OE.*, smooth; polished. TERSE'LY, ad. *-lĭ.* TERSE'NESS, n. *-nĕs*, the state or quality of being terse; conciseness; brevity; neatness of style.—SYN. of 'terse': neat; concise; clear; compact.



Megatherium.



Glyptodon.

Mylodon.

TERTIAN, a. *tĕr'shăn* [L. *tertĭānus*, belonging to the third—from *tertĭus*, the third—from *tres*, three]: recurring every third day, as a certain fever: N. a fever whose paroxysms recur every third day, or every forty-eight hours (see AGUE).

TERTIARY, a. *tĕr'shĭ-ā-rĭ* [L. *tertĭārĭus*—from *tertĭus*, third—from *tres*, three]: third; pertaining to the third: N. in *geol.*, the third or upper great division of the stratified systems, as distinguished from mesozoic and paleozoic, formerly termed *secondary*, and the crystalline rocks, formerly named *primary*, but which, when found mostly metamorphic, surrender that name as a temporary one to the paleozoic. TERTIARY STRATA OR SYSTEM, in *geol.*, the formations that occur above the Chalk till the beginning of the Drift. POST-TERTIARY SYSTEM [L. *post*, after]: the recent and superficial accumulations occurring since the Tertiary. It comprises the periods—known often by the term Quaternary (q.v.)—from the Glacial to the Recent or Human, inclusive.

The *Tertiary* occupies the s.e. of England; and both London and Paris are in basins of this age—the latter locality having afforded to Cuvier (q.v.) material that led to his fame in fossil osteology. The T., from its development of the higher animals, is called the Age of Mammals, of which class all the T. species are extinct. Lyell divided the T. into Eocene (q.v.), Miocene (q.v.), and Pliocene (q.v.). Some European geologists have given the name Oligocene (q.v.) to what others regard as upper Eocene and lower Miocene.—For the sub-divisions of the earliest and latest periods in the United States, with geographical extent and characteristic fossils, see the above titles. To these must be added the earlier Laramie or Lignite period, with deposits partly from brackish water—the beds generally unconformable to the overlying Eocene, and seemingly continuous below with the Cretaceous. They abound on the e. slope of the Rocky Mts. and in Wyo., Ut., and Colo., where, counting different deposits, they are several thousand ft. in total thickness, and afford lignite, mineral coal, and iron ore; they occur also in the upper Missouri region. Though classed with T., they are transitional, with a Cretaceous aspect in shells and T. in plants. Not all the lignite and coal of the w. and s. states are of this period. The Miocene beds appear furthest n. on the Atlantic coast at Martha's Vineyard, Mass., rising in the high bluff of Gayhead, which takes its name from the clays of all colors there—these containing whale vertebræ and large sharks' teeth. Other deposits of this age are found southward to S. C. In the Rocky Mt. region, the Miocene beds, like all the T. later than the Laramie group, are of fresh-water origin; the Cretaceous sea had given place to vast lakes, which became the cemeteries of brute life, the Eocene introducing abundant mammals. The Miocene had the 3-toed horse, Miohippus; a gigantic lion with sabre-like canine teeth, Machærodus; a rhinoceros in N. J.; a camel in Va.; the first beaver; and, besides whales, there are dolphins, seals, walruses, etc. In general, the climate of the T. was semi

tropical far n., as indicated by palms, figs, cinnamon, and warm-climate animals in the upper Missouri region. Many extraordinary forms have been unearthed in the Rocky Mt. region within a few years, such as the 3-toed ungulate mammal *Dinoceras mirabile*, with 3 pairs of horns.

TERTIARY, *tĕr'shĭ-ā-rĭ*, in the Rom. Cath. Church: a member of the third order in a body of 'religious' persons who, without entering into the seclusion of a monastery, aspire to practice in ordinary life all the substantial obligations of the scheme of virtue supposed to be laid down in the gospel. The first institute of Tertiaries was the THIRD ORDER OF ST. FRANCIS (13th c.), followed in the same century by the Third Order of St. Dominic; and the example was in time followed by various other religious orders, e.g., Augustinians, Minims, Carmelites, Trappists. The rules of the Third Order of St. Francis were made public first in 1221. The associates must all be members of the church, and of good repute and blameless life. The intending members must restore all ill-gotten goods, must renounce all evil practices, and abandon all feuds and enmities with their neighbors. The obligation of a T. is irrevocable, unless the party should be released, or should enter into a more strict religious order. The members are required to renounce luxury, profane exercises and amusements, costly or unseemly dress, and the use of arms, except in the necessity of self-defense. They must frequent the sacraments; hear mass, if possible, daily; observe the fasts of the church, as well as certain special austerities; avoid contention, litigation, and unnecessary oaths; cultivate charity toward all, with special obligations toward needy, sick, or afflicted brethren; and practice with more than common fervor the great Christian virtues. The Tertiaries are placed under the authority of superiors elected at intervals and for a stated period, and are liable to an annual visitation, conducted by a priest appointed for the purpose. None of these obligations, however, are supposed to bind the members under pain of mortal sin.

The purpose of St. Francis was that the Tertiaries while living in the world should not be of the world. But, in time, Tertiaries aspired to the conventual life, and thus numerous congregations of Franciscan Tertiaries living in communities like regular friars or regular nuns sprang up in s. Europe. Many such congregations still exist, but the original rule of the institute has a great multitude of followers in the world. The Third Order of St. Dominic exists to-day only as a community institution; the lay brothers and the lay sisters living in convents and not in the world.

TERTULLIAN, *tĕr-tŭl'ĭ-an* (QUINTUS SEPTIMIUS FLORENS TERTULLIANUS, *kwĭn'tŭs sĕp-tĭm'ĭ-ŭs flō'rĕnz tĕr-tŭl-ĭ-ā'nŭs*): one of the church Fathers (see FATHERS OF THE CHURCH), and one of the earliest who used Latin in written compositions: dates of birth and death unknown; b. at Carthage, conjecturally between 150 and 160; d. conjecturally between 220 and 240. He was son of a pro-

consular centurion—i.e., a centurion who attended on the proconsul. He was brought up a heathen, and from his own writings we learn that he was licentious in conduct and fond of the public shows. Of his heathen life nothing more is known. Eusebius describes him as a man exceedingly well acquainted with the laws of the Romans, and his writings bear out the assertion. He certainly received a good education. Some have identified him with one Tertullianus, whose name occurs in the index of the Pandects, and have supposed that he acted as an advocate; but the supposition is a mere conjecture. We know nothing of his conversion: it was probably between 190 and 195. He became a presbyter in the church in Carthage, and was married; and as his wife was a Christian, it is supposed that his marriage took place after his conversion. It is certain that he visited Rome, and was well acquainted with the Roman Church. After remaining a presbyter until he had reached middle age, he became a Montanist. Jerome attributes his adoption of Montanism to the insulting treatment which he received at the hands of the Roman clergy. But this is probably not an entirely accurate account of the matter. Jerome himself had been ill treated by the Roman clergy, and was therefore inclined to blame them; and in the character and general tendency of T.'s opinions, we have ample explanation of his passing over to Montanism. See MONTANUS. He lived to a good old age, remaining a Montanist to the last.

T. was a man of strong passions: he loved and hated with intensity. He was well versed in Roman law, in ancient philosophy, history, and poetry. He was not deficient in philosophical power; but in his intense desire for thoroughness in principles and in their practical application, he became narrow, bigoted, and uncharitable. He shows no sympathy with Greek speculation or with freedom of human thought; and he shows little sympathy with the joys and pleasures of man, being strongly inclined to asceticism. We need not wonder, therefore, that he came to believe in the Paraclete of Montanus as the revealer of the perfection of Christianity, and that he adopted the Montanist opinions that second marriages were adulteries and that it was unlawful to flee in times of persecution, and wrong to receive the lapsed back into the communion of the church. For Montanism, with its frightfully unbalanced thinking and its peril in practical life, was in its origin, as has been well said, an 'evangelical and legal reaction against the political and secular tendencies of the church.' From the church, which at the end of the 2d c. seemed to have diverged far from the great highway marked out for it by Christ and his apostles, men of moral earnestness easily separated themselves—mislead into vagaries in their indignant zeal.

His writings are numerous. Attempts have been made to divide them into those written before he became a Montanist and those written afterward; but the attempts have failed; for in treating many subjects he would have no oc

casion to refer to the Paraclete, second marriages, or persecution.

His works are interesting, throwing much light on the internal circumstances of the church, on the social questions which perplexed Christians, on the opinions of heretics, and on the development of doctrine. Of his theology, Neander remarks: 'In T. we find the first germ of that spirit which afterward appeared with more refinement and purity in Augustine, as from Augustine the scholastic theology proceeded, and in him also the Reformation found its point of connection.' Among T.'s peculiar opinions was his belief in the corporeality of the human soul.

His writings had great influence on the subsequent ages, but especially on Cyprian. Jerome says: 'I saw at Concordia, in Italy, an old man named Paulus. He said that, when young, he had met at Rome with an aged amanuensis of the blessed Cyprian, who told him that Cyprian never passed a day without reading some portion of T.'s works; and used frequently to say: *Give me my master*, meaning Tertullian.'

There are many editions of T.; the best is by Franciscus Oehler (3 vols. 8vo. Leip. 1853): vol. III. contains the principal dissertations on his life and writings. His works, with many dissertations and notes, form the vols. I., II. of Migne's *Patrologia Latina.* A satisfactory account of T.'s life, writings, and opinions is in Bp. Kaye's *Ecclesiastical History of the Second and Third Centuries, Illustrated from the Writings of Tertullian* (8vo, 2d ed., Cambridge 1829); and in Neander's *Anti-gnosticus, or the Spirit of Tertullian*, transl. by J. E. Ryland. A good transl. of T.'s works is in Clark's *Ante-Nicene Christian Library*, ed. by Drs. Roberts and Donaldson.

TERZA-RIMA, n. *tĕrt'sä-rē'mä* [It. *terza-rima*, a third or triple rhyme—from *terza*, third; *rima*, rhyme]: a complicated system of versification, borrowed by the early Italian poets from the troubadours. For an example in English, see Byron's *Prophecy of Dante.*

TERZETTO, n. *tĕrt-sĕt'tō* [It. *terzetto*, a trio—from It. *terzo*, third—from L. *tertius*, third]: in *music*, a composition in three parts; a trio.

TESCHEN, *tĕsh'ĕn:* town of Austrian Silesia, on the right bank of the Olsa, 38 m. e.s.e. of Troppau. Here, 1779, a treaty of peace was concluded between Maria-Theresa and Frederick II., by which the dispute of the Bavarian succession was brought to an end.—Pop. (1880) 9,267.

TESLA, *tĕs'lä*, NIKOLA: electrician: 1857— ————; b. Smiljan, Croatia. He studied at Carlstadt, and at the Polytechnic School in Gratz, Austria, and afterward at the École Polytechnique, Paris. After graduating at Gratz (1881), he entered the telegraph service at Buda-Pesth, where he became an expert in the construction of dynamos. He was engineer of the Edison station in Paris, and after removing to the United States (1886), he was employed at Edison's laboratory, near Orange, N. J., later settling in New York, where he opened a laboratory of his own for

independent research. He soon made new experiments which resulted in surprising discoveries regarding the correlation of force and the method of transforming the electric current into light. He devised new mechanism for producing the alternating current, and was able to exhibit in New York, London, and Paris an aurora quite detached from his electrodes; one of his most remarkable productions being a luminous cloud, hanging in space, without any machinery being visible. The 50,000 horse-power plant built to transmit the water-power of Niagara Falls to Buffalo and other places is the outcome of his rotary field-motor invented 1888. It was stated he aimed to set matter into vibration at rate of 3,000,000 vibrations a second, and showed that electric lamps and motors can be operated without a circuit. Believing that by causing matter to reach a state of luminious vibration, quickly passing through the stage of heat-vibration, it would cause light without heat, he set about developing his theory, and in the cause of his experiments actually received a current of 200,000 volts in his body without injury. T. has suggested that the so-called X-rays, as well as the cathode rays, are not rays at all (*i.e.*, etheric waves), but streams of particles of matter shot forth from the cathode surface, and of sufficient minuteness and momentum to traverse the interspaces between the molecules in the wall of the tube and other solid bodies; he has found that the metals, when ranged according to their powers of reflecting X-rays, correspond to the contact series of metals in air. In 1900, May 1, he patented a method of transmitting electrical energy without wires. In 1901 T. discovered that the capacity of the electrical conductor is variable. In the same year he announced the discovery of a method of transmitting wireless messages, to any distance, through the earth, which acts as a connecting medium between a transmitter and a receiver.

TESSELLATE, v. *tĕs'sĕ-lāt* [L. *tessellātus*, furnished with small square stones or little cubes for paving—from *tessella*, a small cube, dim. of *tessĕra*, a squared block]: to form into squares or checkers; lay with checkered-work. TES'SELLATING, imp. TES'SELLATED, pp.: ADJ. formed in little squares or mosaic-work; covered with squares like a chess-board. TES'SELLA'TION, n. *-lā shŭn*, mosaic-work; the operation of making mosaic-work. TES'SELLAR, n. *-lĕr*, formed in little squares. TES'SELLITE, n. *-līt*, a mineral which exhibits a peculiar tessellated or mosaic-like structure.

TESSERA, n. *tĕs'sĕr-ă*, TES'SERÆ, n. plu. *-ē* [L. *tessĕra*, a cube, a die—from Gr. *tessărĕs*, four]: small six-sided solid of marble, earthenware, glass, etc., used for tessellated pavements, ornamenting walls, etc.; in *anc. Rome*, a small square of anything used as a token or ticket. TES'SERAL, a. pertaining to or of the nature of tesseræ. TES'SULAR, a. *-sū-lĕr*, cubical; having equal axes; in crystallography, isometrical.

TEST, n. *tĕst* [L. *testis*, a witness]: oath which Brit. military and civil officers were obliged to take against Popery under the celebrated *Test Act* of Charles II.'s reign, re-

pealed 1828 (see TEST ACTS): oath or affirmation generally. TEST'ABLE, a. *-ă-bl,* capable of being devised or given by will. TESTACY, n. *těst'a-sĭ,* in *law,* the state or condition of being testate, or of leaving a valid testament or will at death.

TEST, n. *těst* [L. *testa,* a shell]: the shell of the *Mollusca,* hence sometimes called *Testacea;* the calcareous case of echinoderms; the thick, leathery, outer tunic in the tunicata: see TESTA.

TEST, n. *těst* [OF. *test,* shell, test—from L. *testa,* earthen vessel, shell: It. *testo,* an earthen pitcher, a goldsmith's melting-pot]: the vessel in which a metal is tried; a cupel; any critical or crucial trial or examination; means of trial; anything used to distinguish substances or to detect their presence; standard; criterion; proof: V. to bring to a trial and examination; compare with a standard; prove by experiment; put to the proof; to refine, as gold or silver, by means of the test. TEST'ING, imp.: N. the act of trying for proof; the operation of refining gold or silver by the test (see TESTING). TEST'ED, pp. tried by a test. TEST'LESS, a. *-lĕs,* that cannot be tested. TESTING CLAUSE, in a *Scotch deed,* the last clause, narrating when and where the parties signed the deed, before what witnesses, the number of pages of which the deed consists, and the name of the person who penned it, as well as any erasures made in engrossing It is an essential part of a Scotch deed. TEST-PAPER, in *chem.,* strip of paper impregnated with a reagent, used for detecting the presence of certain substances: it is made by dipping unsized paper into an alcoholic solution of a vegetable coloring matter which changes color when exposed to the action of an acid or alkaline solution. The paper, after being gently dried, is cut into slips of a suitable size. Hence, by dipping the appropriate test-papers into any solution, we can ascertain whether it is acid, alkaline, or neutral. Litmus and turmeric are most used as the coloring matters; litmus for detection of acids, and turmeric for that of alkalis. TEST-TUBE, in *chem.,* tube or glass for holding substances to be tested or analyzed.—Syn. of 'test, n.': standard; criterion; proof; trial; experiment; experience.

TESTA, n. *tĕs'tă*, TES'TÆ, n. plu. *-tē* [L. *testa*, a shell, a tile]: a shell; in *bot.*, the outer covering of the seed; the shell-like covering of certain animals. TESTACEANS, n. plu. *tĕs-tā'shănz*, or TESTA'CEA, n. plu. *-shĭ-ă*, a general name for those molluscous animals that are furnished with a shelly covering, as the oyster, periwinkle, etc. TESTACEL, n. *tĕs'tā-sĕl*, a little shell. TESTACEOUS, a. *tĕs-tā'shŭs*, pertaining to or composed of shells; having a hard shelly covering; shelly. TESTA CEOL'OGY, n. *-sē-ŏl'ŏ-jĭ* [Gr. *logos*, a discourse]: the science of conchology.

TEST ACTS, otherwise called CORPORATION ACTS: two English statutes imposing certain oaths on the holders of public offices. Act 13 Car. II. c. 2, directed that all magistrates should take the oaths of allegiance and supremacy, as well as an oath renouncing the doctrine that it is lawful to take arms against the king; and provides that they must receive the communion according to the rites of the Church of England within a year before their election. Act 25 Car. II. c. 1, imposed like conditions on the holders of all public offices, civil and military, and obliged them in addition to abjure belief in the doctrine of transubstantiation. These acts, which were practically evaded by means of an act of indemnity passed every year, were repealed by 9 Geo. IV. c. 17, so far as regarded the administration of the sacrament, for which a declaration set forth in that act was substituted. A statute of William IV. substituted a declaration for an oath in most government offices. A new form of oath has been substituted for the oaths of supremacy, allegiance, and abjuration by 21 and 22 Vict. c. 48: see ABJURATION, OATH OF: OATH.

TESTAMENT, n. *tĕs'tă-mĕnt* [F. *testament*—from L. *testamentum*, a will—from *testor*, I bear witness to; *testis*, a witness: It. *testamento*]: a written document, properly attested, in which a person declares his pleasure as to the disposal of his property after his death; a Will (q.v.); one of the two great divisions of the Holy Scriptures, as the Old Testament, the New Testament (see BIBLE). TES'TAMENT'ARY, a. *-mĕnt'ĕr-ĭ*, pertaining to a will; bequeathed or devised by a will; contained in a will. TES'TAMENT'AL, a. *-ăl*, pertaining to a will; testamentary.

TESTAMUR, n. *tĕs-tā'mĕr* [L., we testify—from *testor*, I testify]: a certificate of having successfully passed a certain examination—so named from the L. word which begins it; a certificate given by an Eng. univ. or a church dignitary.

TESTATE, a. *tĕs'tāt* [L. *testātus*, having made a will—from *testāri*, to provide for by will]: having made and left a will; disposed of by will: N. one who has left a will at death. TESTATOR, n. *tĕs-tā'tĕr* [L.]: a man who makes a will. TESTA'TRIX, n. *-trĭks* [L.]: a woman who makes a will.

TESTATUM, *tĕs-tā'tŭm:* the Witnessing or Operative part of an English deed: it begins with the words, 'Now this indenture witnesseth that,' etc.; and includes a statement of the consideration-money and the receipt thereof.

TESTER, n. *tĕs'ter* [OF. *testiere*, the head-piece of anything, crown of a hat—from *teste*, the head—from L. *testa*, a skull, a shell]: a flat canopy over anything, e.g., bed, pulpit, tomb, etc.; called also TESTOON: an OF. and OE, coin, value about sixpence—named from the stamp of the sovereign's head on one side; a sixpence. TES'TERN, v. *-tĕrn*, in *OE.*, to give a tester to: N. in *OE.*, a sixpence. HALF-TESTER, a canopy which extends but a short distance over the head.

TESTICLE, n. *tĕs'tĭ-kl* [L. *testic'ŭlus*, a testicle, a dim. from *testis*, a testicle—probably the same as *testis*, a witness, that is, a proof of virility: It. *testicolo*]. in the *male*, one of the two glands which secrete the seminal fluid (see REPRODUCTION). TESTICULATE, a. *tĕs-tĭk'ū lāt*, or TESTIC'ULATED, a. *-ĕd*, or TESTIC'ULAR, a. *-ū-lĕr*, in *bot.*, shaped like or resembling a testicle; having two oblong tubercles, as a root.

TESTIFY, v. *tĕs'tĭ-fī* [L. *testificor*, I bear witness—from *testis*, a witness; *facĭō*, I make: It. *testificare*]: to state or declare on oath; publish and declare freely; give evidence or testimony; to bear witness. TES'TIFYING, imp. TES'TIFIED, pp. *-fīd*. TES'TIFICA'TION, n. *-fĭ-kā'shŭn*, the act of giving testimony or evidence. TES'TIFICA'TOR, n. *-tĕr*, one who gives evidence. TES'TIFI'ER, n. *-ĕr*, one who testifies.

TESTILY, TESTINESS: see under TESTY.

TESTIMONIUM, *tĕs-tĭ-mō'nĭ-ŭm:* the Attestation Clause of a deed or legal instrument, beginning with the words, 'In witness whereof,' and stating that the party signed the deed: see TESTING CLAUSE, under TEST.

TESTIMONY, n. *tĕs'tĭ-mō'nĭ* [L. *testĭmōnĭum*, witness, evidence—from *testis*, a witness]: evidence; a solemn declaration or affirmation for the purpose of establishing or proving some fact; declaration; representation; open attestation; manifestation; in *Scrip.*, the tables or book of the law; the gospel; the Word of God: V. in *OE.*, to witness. TES'TIMON'YING, imp. *-mō'nĭ-ĭng*. TES'TIMONIED, pp. *-mŭn-ĭd*. TES'TIMO'NIAL, n. *-mō'nĭ-ăl*, a written certificate in favor of one's conduct, qualifications, or abilities; a certificate of merit, worth, genuineness, or the like; something presented as an acknowledgment of an individual's public services, or as a token of respect for his private worth.—SYN. of 'testimony, n.': proof; attestation; witness, evidence; corroboration; confirmation; affirmation.

TESTING, in Chemistry: series of processes, involving many details: it may be regarded as equivalent to qualitative analysis. As a simple illustration of the process of T., whose full presentation cannot here be given, we will assume that the most common of all chemical compounds, a salt, is submitted for examination. The student must pursue some such course as the following. 1. He must examine the dry substance before the blow-pipe, and note whether (*a*) it is volatile, as are the salts of ammonia and mercury; or (*b*) fusible, as are the salts of potash and soda; or (*c*) infusible, as are the salts of zinc, alumina, magnesia, lime, strontia, and baryta; or (*d*) reducible, as are the salts of silver, tin, lead, bismuth, antimony, and cadmium; and (*e*) whether it gives a coloration to the borax bead, and what that color is. 2. Having made his blow-pipe examination, he must bring his substance to a finely divided state, and dissolve it, if possible, in water; or if insoluble in that fluid even with the aid of heat, then in hydrochloric or nitric acid. The solution, whether in water or acid, to which no test or reagent has been applied, is termed by Odling and others *the original solution;* and to this are added various tests, such as sulphuretted hydrogen, hydrosulphate of ammonia, ammonia, nitrate of silver, etc. The most common effect resulting from addition of a gaseous or liquid reagent is to cause a *precipitate* or solid deposit of either the base or acid sought for. These precipitates differ in color, consistency, etc.; and the student must note not only the color of the precipitate (the most important point), but also whether the deposit is crystalline, gelatinous, clotty, etc. 3. He must then ascertain to which group the base that he is seeking belongs. There are three great groups of bases; the members of the first group being precipitated from their acid or acidified solutions by sulphuretted hydrogen (hydrosulphuric acid); those of the second group not being thrown down by this reagent, but being precipitated from neutral solutions by hydrosulphate of ammonia (sulphide of ammonium); while those of the third group are not thrown down by either of these reagents. The first group includes tin, arsenic, antimony, bismuth, mercury, lead, silver, copper, and cadmium; the second, nickel, cobalt, manganese, iron, chromium, aluminium, and zinc; the third, barium, strontium, calcium, magnesium, potassium, sodium, and ammonia. 4. Having ascertained to which base the group belongs, the next point is to identify it: for information on this point, see standard works on qualitative analysis or on practical chemistry. 5. The base being thus determined, it remains to determine the acid; and in this the student will be much assisted by a knowledge of the solubility of the most important classes of salts. Knowing, e.g., the insolubility of the sulphates of baryta and strontia, he need not search for sulphuric acid in a soluble salt of one of these earths. On the other hand, a salt insoluble in water is not likely to be a nitrate, or chlorate, or acetate, or chloride (the only chlorides insoluble in water being chloride of silver and calomel). We cannot enter into the testing for acids further than to ob-

serve that the nitrates and chlorates deflagrate; the tartrates and citrates char; the carbonates effervesce when acted on by an acid more energetic than carbonic acid; the silicates, borates, and benzoates are precipitated by hydrochloric acid; and the arseniates and chromates react with hydrosulphuric acid. The presence of any particular acid is more or less indicated by its behavior, while still in union with the base, with strong sulphuric acid, which in many cases causes evolution of characteristic fumes or vapors; and among tests especially applicable for detection of the acids (in acid solutions) are solutions of nitrate of baryta, nitrate of silver, chloride of calcium, and perchloride of iron. As the above remarks apply merely to the detection of the base and acid contained in a single salt, it is evident how much the difficulties are increased when there is a mixture of several salts; or where, instead of a metallic oxide, a vegetable base is present; or where we have to deal with a complicated mixture of organic and inorganic substances—e.g., in investigating the contents of the stomach in a case of suspected poisoning.—The following works on the subject may be referred to: Fresenius's *Qualitative Analysis;* Noad's *Qualitative Analysis;* Greville Williams's *Outlines of Chemical Manipulation;* Bowman's *Practical Chemistry;* Odling's *Practical Chemistry.*

TESTRIL, n. *tĕs'trĭl* [see TESTER]: in *OE.*, a sixpence.

TESTUDO, n. *tĕs-tū'dō* [L. *testūdo*, a tortoise, or covering like it—from *testa*, a shell]: in *anc. Rome*, a protective covering or screen of overlapping shields formed by soldiers advancing in close array to the attack, and resembling somewhat the back of a tortoise: also, a machine moving on wheels, and roofed, under which soldiers worked in undermining or destroying the walls of a besieged place (see BATTERING RAM): in *med.*, a broad soft tumor, called also a *talpa*. TESTU'DINAL, a. *-dĭ-năl*, pertaining to the tortoise or resembling it. TESTU'DINATE, a. *-nāt*, or TESTU'DINATED, a. *-nā-tĕd*, shaped like the back of a tortoise; vaulted; arched. TESTUDINEOUS, a. *tĕs'tū-dĭn'ē-ŭs*, resembling the shell of a tortoise.

TESTU'DO: typical genus of Testudinidæ: see TORTOISE.

TESTY, a. *tĕs'tĭ* [OF. *testu*, testy, headstrong—from OF. *teste;* F. *tête*, the head—from L. *testa*, a skull, a shell]: fretful; peevish; easily irritated; petulant. TES'TILY, ad. *-tĭ-lĭ*. TES'TINESS, n. *-nĕs*, ill-nature; petulance; peevishness.

TETANUS, n. *tĕt'ă-nŭs* [L. *tetănus:* Gr. *tetănos*, a stiffness or spasm of the neck—from Gr. *teinō*, I stretch]: disease characterized by violent and continued contraction or spasms of the muscles, resulting in rigidity and incurvations of various parts; the disease called lock-jaw. TETANIC, a. *tĕ-tăn'ĭk*, pert. to or of the nature of tetanus: N. a medicine which acts on the nerves, and through them on the muscles. TETANOID, a. *tĕt'ă-noyd* [Gr. *eidos*, resemblance]: resembling tetanus.—*Tetanus* is one of the most formidable diseases of the nervous system, and is characterized by an involuntary, persistent, intense, and painful contraction or cramp (see SPASM) of more or less extensive groups of the voluntary muscles, nearly the whole body being sometimes affected. There is usually some degree of order in which the different sets of muscles are affected. The muscles of the neck, jaws, and throat are almost always the first to evince the disease. The patient, says Dr. Watson, from whose work this description is largely quoted, feels a difficulty and uneasiness in bending or turning his head, and supposes that he has what is called a stiff neck. He finds also that he is unable to open his mouth with the customary facility. At length the jaws close—sometimes gradually, but with great firmness; sometimes (it is said) suddenly, and with a snap. In four cases, perhaps, out of five, the disease begins in this way with *trismus* or *lock-jaw;* so that this last is the popular name for the disease. With this symptom, or very soon after it, the muscles concerned in swallowing become affected; and in a short time there comes on, what is often the most distressing part of the disorder, an acute pain at the lower part of the sternum, piercing through to the back. This pain depends, it can scarcely be doubted, on cramp of the diaphragm, and is subject to aggravation in paroxysms. The spasm extends to the muscles of the *trunk;* to the *large* muscles of the extremities; to the muscles of the *face;* and, last of all, in general to the muscles of the tongue and of the hands and fingers, which often remain movable at the will of the patient, after all the other voluntary muscles of the body have become fixed (see Watson's *Lectures, etc.*). The muscles that are affected remain permanently contracted till either recovery or death ensues; and some of them, e.g., the muscles of the abdomen, seem as rigid as a board, when struck by the fingers: a perfect remission of the spasm scarcely ever occurs, except sometimes during sleep. Exacerbations of the spasms, on the other hand, generally occur every 10 or 15 minutes, beginning usually by an increase of the pain at the sternum, and lasting two or three minutes; and as the disease advances, these paroxysms become more frequent. The powerful muscles of the back generally overcome the muscles in front; and when this excess of morbid power in the back is marked, the result is that the patient during the paroxysms rests solely on his head and heels, while his body is raised in an arched form. Occasionally the muscular contraction predominates in the opposite direction, and brings the head and knees in contact; more rarely, the body is bent to one side.

During the exacerbations the face of the patient often presents a frightful appearance. The tongue is apt to get bitten during the contractions, which are occasionally so violent as to break the teeth, rupture powerful muscles, and, at least in one case, to fracture the thigh-bone. Death usually results from a mixture of causes, but mainly from apnœa (breathlessness), due to the fixed condition of the respiratory muscles, associated with asthenia (loss of power) and flagging of the heart's action.

There are two principal causes of this disease: (1) exposure to cold and damp; (2) bodily injuries. When T. arises from the *first* of these causes, it is termed *idiopathic;* and when from the second, *traumatic.* Idiopathic T. is rare. Traumatic T. is liable to follow any kind of injury, from a trifling cut or scratch to a compound fracture or the most severe operation, and is much more frequent in tropical than in temperate climates. The following table, given by Poland in his article 'Tetanus' in Holmes's *System of Surgery*, shows the relative proportions which the occurrence of Tetanus bears to various classes of surgical lesions observed at Guy's Hospital during seven years:

There were of—					
Major and minor operations,	1,364	cases—tetanus	occurred	in	1
Wounds of all varieties,	594	"	"	"	9
Injuries and contusions,	856	"	"	"	1
Burns and scalds,	458	"	"	"	3
Compound fractures,	396	"	"	"	9
Total,	3,668				23

Thus it appears that T. (a comparatively rare disease) is most frequent in the more severe varieties of injury and accident, such as compound fractures, burns, and injuries to the fingers and toes. It is still in question whether the seat of the injury forms any special connection with the disease. Hennen, one of the great authorities on military surgery, observed it oftener after wounds of the elbow and knee; others, more frequently from injuries of the thumb and great toe. There is at least a popular belief that wounds of the ball of the thumb are especially likely to be followed by tetanus.

The interval between the reception of the injury and the first tetanic symptoms usually varies from the 4th to the 14th day, and rarely exceeds 22 days, some time in the second week being the most common period. As a general rule, the more rapidly the disease comes on, the more fatal will be the result.

Mere *trismus* or lock-jaw may be induced by affections of the teeth, especially by difficult dentition of the wisdom-teeth; but this is a purely local affection, in which the muscular contraction, though persistent, is never increased by painful spasmodic paroxysms, and which usually disappears on the removal of the exciting cause; and the general knowledge of this fact may tend to remove unnecessary terrors. Hysteria sometimes mimics the phenomena of T. with marvellous fidelity; and hydrophobia and T. have been mistaken for each other, in consequence

of the spasm of T. sometimes affecting the muscles of deglutition and inducing a fear of swallowing. There is, however, no great difficulty in detecting the difference between T. and any other disease; but there is a form of poisoning which produces almost every symptom of T., and which may be termed *artificial tetanus*. If strychnia or brucia, or their salts, or vegetable matter containing either or both of these alkaloids, e.g., nux vomica, St. Ignatius's beans, or the juice of the upas tiente, be administered, either by the stomach or by inoculation, it induces all the symptoms of intense T.; and there is no test by which to distinguish the results of the disease and of the poisoning, except that, according to Dr. Christison, the disease never proves so quickly fatal as the rapid cases of poisoning with strychnia: see NUX VOMICA. (Consult the authorized *Report of Palmer's Trial.*)

In treatment, almost every known medicine has been prescribed; but with whatever treatment, a great majority of cases end fatally. Like some fevers, T. seems to have a definite course to run; and, as has been wisely suggested, all that can be done is to enable the patient to wear out the attack by giving him as much strength as possible, and not adding fuel to the fire by all sorts of applications and internal remedies, which have again and again signally failed. If the patient can be helped onward one day after another, much is gained: constant watching and attention are requisite night and day; besides avoidance of all causes of excitement, and protection especially from cold air or winds, taking care to keep a uniform temperature. When, in consequence of the strong contraction of the muscles of the jaw, it is impossible to open the patient's mouth, food and medicine should be introduced into the stomach by means of a flexible tube passed through one of the nostrils.

For the peculiar form of T. that occurs in newly-born children, see TRISMUS NASCENTIUM.

TETANUS, or LOCK-JAW, occurs in most of the domesticated animals, but most frequently in horses and sheep: it is produced usually by cold and wet, by intestinal worms, obstinate constipation, or injuries. The symptoms usually come on gradually, involving most of the muscular structures, which become hard and rigid; the nose is protruded, the limbs move stiffly, the tail is upraised, the bowels are constipated. The animal must be kept perfectly quiet, and in an airy but moderately warm place; and plentifully supplied with cold water, and with soft but moderately nutritive food, which he will usually greedily suck in through his firmly-closed teeth. A full dose of purgative medicine must at once be given; extract of belladonna twice or thrice daily is occasionally serviceable; any discoverable wound or injury should be fomented or poulticed; bleeding, sedatives, and all causes of irritation must be avoided. In adult animals, most cases are fatal; but among young animals, especially when the attack results from exposure to cold, many recoveries occur.

TETCHY, TETCHINESS, TETCHILY: see TECHY.

TÊTE, n. *tāt* [F. *tête*, the head—from L. *testa*, a skull, a shell]: false hair; a front or wig. TETE-À-TETE, n. *tāt'ȧ-tāt'* [F., head to head]: private conversation; familiar interview or conference; a kind of sofa: ADJ. confidential; familiar; private: AD. face to face; familiarly. TETE'-DU-PONT', *-dŭ-pŏng'* [F., the head of the bridge]: in *fort.*, any work or system of works thrown up at the end of a bridge in order to cover the communication across a river: see BRIDGE-HEAD.

TETHER, n. *tĕth'ĕr* [Icel. *tjodra*, to tether: Sw. *tjuder;* Low Ger. *tider*, a tether: Gael. *teadhair*, a tether]: a rope or chain by which an animal is confined to certain limits while grazing; anything by which one is restrained: V. to confine by a rope; to restrain within certain limits. TETH'ERING, imp. TETH'ERED, pp. *-ĕrd.* LENGTH OF ONE'S TETHER, the extreme limits to which one can go.

TETHYS, n. *tē'thĭs* [L.—from Gr. *Tēthus*]: in *Gr. myth.*, the greatest of the sea-deities, wife of Oceanus, daughter of Uranus and Terra, and mother of the chief rivers of the universe, Nile, Peneus, Simois, Scamander, etc., and of about three thousand daughters called Oceanides. The name Tethys is said to signify nurse.—In *astron.*, T. is the name of a satellite of Saturn.

TETRA-, *tĕt'rȧ* [Gr. *tetra*, a prefix—from *tettăres*, four]: a common prefix in scientific and technical terms, signifying 'four;' fourfold; four times.

TETRABRANCHIATA, n. plu. *tĕt'rȧ-brăng-kĭ-ā'tȧ* [Gr. *tetra*, four; *brangchia*, gills]: an order of the Cephalopoda, including the pearly nautilus, characterized by having four gills. TET'RABRAN'CHIATE, a. *-kĭ-āt*, having four gills.

TETRACHORD, n. *tĕt'rȧ-kawrd* [Gr. *tetra*, four; *chordē*, a chord]: in *anc. music*, a series of four tones of which the first and last constituted a fourth; an instrument with four strings.

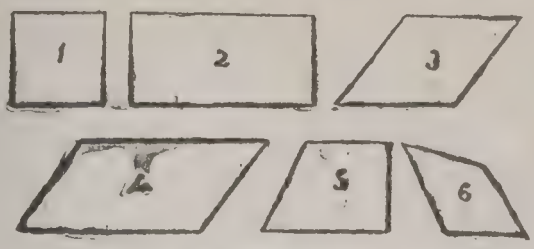
TETRACOCCOUS, a. *tĕt-rȧ-kŏk'kŭs* [Gr. *tetra*, four; *kokkos*, a kernel]: in *bot.*, having four cells elastically dehiscing and separating.

TETRAD, n. *tĕt'rȧd* [Gr. *tetras* or *tetrada*, the number four]: the number four; four of anything taken collectively; in *chem.*, an element of four equivalents.

TETRADYMITE, n. *tĕ-trăd'ĭ-mīt* [Gr. *tetradumos*, fourfold—from *tetra*, four]: a mineral, sulpho-telluride of bismuth, so called from the quadruple macles in which its crystals usually appear.

TETRADYNAMOUS, a. *tĕt'rȧ-dĭn'ȧ-mŭs*, or TET'RADYNA'MIAN, a. *-dĭ-nā'mĭ-ȧn* [Gr. *tetra*, four; *dunămis*, power, strength]: in *bot.*, having six stamens, four of which are uniformly longer than the others; of the class TET'RADYNA'MIA, n. *-nā'mĭ-ȧ.*

TETRAGON, n. *tĕt'ră-gŏn* [Gr. *tetra*, four; *gōnĭa*, a corner, an angle]: a plane figure having four angles, as a



Tetragons:
1, Square. 2, Parallelogram or Oblong. 3, Rhombus. 4, Rhomboid. 5 and 6, Trapezium.

square, a rhombus, etc. TETRAGONAL, a. *tĕ-trăg'ō-năl*, having four angles and sides. TETRAGONOUS, a. *tĕ-trăg'ō-nŭs*, tetragonal.

TETRAGONIACEÆ, *tĕt-ra-gō'nĭ-ā'sē-ē*: formerly a natural order of exogenous plants, but now included in *Ficoideæ*, to which belongs the genus *Mesembrianthemum*, from which the genus *Tetragonia* differs chiefly in lack of petals. The species are herbaceous plants or small shrubs, with alternate, thick, succulent leaves. A few are found on Mediterranean shores, and some in Asia and the South Sea Islands; but the order abounds chiefly in s. Africa. New Zealand Spinach (q.v.) belongs to this order. Other species also are used like spinach, e.g., *Sesuvium portulacastrum* and *S. repens* in the W. Indies. Species of *Aizoon* are among plants burned for barilla in Spain and the Canary Isles.

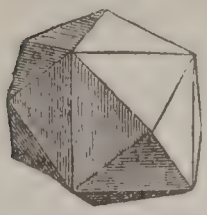
TETRAGRAM, n. *tĕt'ră-grăm* [prefix, *tetra-*; Gr. *gramma*, a line]: word of four letters; in *geom.*, figure formed by four right lines. TETRAGRAM'MATON, n. *-ma-tŏn* [Gr. *to tetragrammaton*, the word of four letters; *tetragrammatos*, of four letters—prefix, *tetra-*; *gramma*, *grammatos*, a letter]: the sacred Hebrew name of the Deity (Y H V H—representing Yahveh or Jehovah); from the fact that that name, being deemed too sacred to be uttered, was in the rabbinical writings distinguished by such expressions as, 'the name,' 'the name of four letters,' etc.

TETRAGYNIAN, a. *tĕt'ră-jĭn'ĭ-an*, or TETRAGYNOUS, a. *tĕ-trăj'ĭ-nŭs* [Gr. *tetra*, four; *gunē*, a woman]: in *bot.*, having four carpels or four styles; of the class TET'RAGYN'IA, n. *-jĭn'ĭ-ă*.

TETRAHEDRON, n. *tĕt'ră-hē'drŏn* [Gr. *tetra*, four; *hĕdra*, a seat, a base]: solid figure having four sides, consisting of equal equilateral triangles; one of the five regular solids; a form assumed by some crystals, and in crystallography considered a secondary form of the Octahedron (q.v.), produced by removing the alternate angles or edges of the latter. TET'RAHE'DRAL, a. *-drăl*, bounded by four equilateral and equal triangles. TETRAHEDRITE, n. *tĕt'ră-hē'drīt*, a sulphide of copper and antimony; gray copper ore; fahl ore.

Tetrahedron.

TETRAHEXAHEDRON, n. *tĕt'rā-hĕks'ā-hē'drŏn* [Gr. *tetra*, four; *hex*, six; *hedra*, a seat or base]: in *crystals*, a solid bounded by twenty-four equal faces, four corresponding to each face of the cube. TET'RAHEX'AHE'-DRAL, a. *-hē'drăl*, exhibiting four ranges of faces one above another, each range containing six faces.



Tetrahexahedron.

TETRALOGY, n. *tĕ-trăl'ŏ-jĭ* [Gr. *tetralog'ĭa*—from *tetra*, four; *logos*, a word]: in the *Gr. drama*, a group of four dramas—three tragedies, and one satiric play (or sometimes four tragedies)—exhibited for the prize at the festivals of Dionysus.

TETRAMEROUS, a. *tĕ-trăm'ĕr-ŭs* [Gr. *tetra*, four; *měros*, a part]: in *bot.*, composed of four parts, or in fours or multiples of four.

TETRAMETER, n. *tĕ-trăm'ĕ-tĕr* [Gr. *tetra*, four; *metron*, a measure]: a verse consisting of four measures.

TETRANDROUS, a. *tĕ-trăn'drŭs*, or TETRAN'DRIAN, a. *-drĭ-ăn* [Gr *tetra*, four; *anēr* or *andra*, a man]: having four stamens; of the class TETRAN'DRIA, n. *-drĭ-ă*.

TET'RAO AND TETRAON'IDÆ: see GROUSE.

TETRAPETALOUS, a. *tĕt'rā-pĕt'ā-lŭs* [Gr. *tetra*, four; *petălon*, a leaf]: in *bot.*, containing four distinct petals or flower-leaves.

TETRAPHYLLOUS, a. *tĕt'rā-fĭl'lŭs* [Gr. *tetra*, four; *phullon*, a leaf]: in *bot.*, having four leaves.

TETRAPLA, n. *tĕt'rā-plā* [Gr. *tetraplous*, fourfold]: an edition of the Bible in four languages: specifically, an edition containing four different Greek versions arranged in parallel columns by Origen, one of the ancient fathers.

TETRAPOLITAN CONFES'SION, *tĕt-ra-pŏl'ĭ-tan:* formula of Protestant orthodoxy offered to Emperor Charles V. at Augsburg 1530, June 24, as a substitute for the 'Augustan Confession' or Confession of Augsburg (q.v.). The representatives of the four cities, Constance, Lindau, Memmingen, Strasburg, declined to subscribe that confession because of its teaching with regard to the Lord's Supper, and therefore presented to the emperor and the diet their own confession of faith, called *Tetrapolitan* as expressing the belief of the 4 cities [Gr. *tetra-* (*tessares*, *tettares*), four, and *polis*, city]. The T. C. was written by Capito and Bucer. It contained 23 articles. The difference in doctrine between the T. C. and the Augustan was inconsiderable and concerned the Eucharist. It laid more stress on the authority of the Bible than does the Augustan Confession.

TETRAPTEROUS, a. *tĕ-trăp'tĕr-ŭs* [Gr. *tetra*, four; *pteron*, a wing or a fin]: having four wings. TETRAP'-TERAN, n. *-ăn*, an insect having four wings.

TETRAQUETROUS, a. *tĕt'rā-kĕt'rŭs* [Gr. *tetra*, four; L. *quadra*, a square]: in *bot.*, having four angles, the faces being concave.

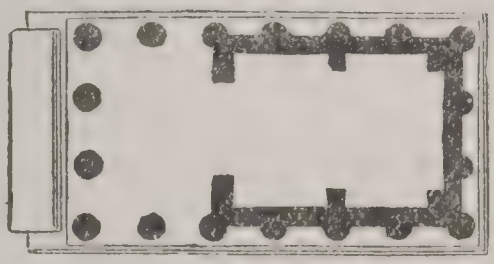
TETRARCH, n. *tĕt'rârk* [Gr. *tetrar'chēs*—from *tetra*, four; *archein*, to be first, to rule]: governor of the fourth part of a Roman province; later, any petty prince or sovereign. TET'RARCHATE, n. *-râr-kāt*, or TET'RARCHY, n. *-ki*, district governed by a tetrarch; the office or jurisdiction of tetrarch. TETRARCHICAL, a. *tĕt-râr'ki-kăl*, pertaining to a tetrarchy.—*Tetrarch*, in the usage of the later Roman empire, denoted any minor ruler, especially in the East, possessing sovereign rights within his territory, but dependent on the emperor, and in many cases removable at his pleasure. This was the case especially in Syria, where the princes of the family of Herod are called indiscriminately by this title (Lk. iii. 1) and by that of king (Matt. xiv. 9). The T. in this latter sense was in truth a sovereign, though a dependent sovereign; and there are instances in which the title seems to have been applied to really independent sovereigns of small principalities.

TETRASPERMOUS, a. *tĕt'ră-spĕr'mŭs* [Gr. *tetra*, four; *sperma*, seed]: in *bot.*, having four seeds.

TETRASPORE, n. *tĕt'ră-spōr* [Gr. *tetra*, four; *sporos*, a seed]: among the *algæ* or seaweeds, a spore formed by the division of a mother-cell into four.

TETRASTICH, n. *tĕ-trăs'tĭk* [Gr. *tetra*, four; *stichos*, a row, a verse]: an epigram or stanza of four verses.

TETRASTYLE, n. *tĕt'ră-stīl* [Gr. *tetra*, four; *stulos*, a



Tetrastyle Temple, Fortuna Virilis.

column]: in *anc. arch.*, a building with four columns in front: ADJ. pertaining to or resembling a tetrastyle.

TETRASYLLABLE, n. *tĕt'ră-sĭl'lă-bl* [Gr. *tetra*, four, and Eng. *syllable*]: a word of four syllables. TET'RASYLLAB'IC, a. *-sĭl-lăb'ĭk*, or TET'RASYLLAB'ICAL, a. *-lăb'i-kăl*, consisting of or having four syllables.

TETRATHECAL, a. *tĕt'ră-thē'kăl* [Gr. *tetra*, four; *thēkē*, a case]: in *bot.*, having four loculaments or thecæ.

TETRAVALENT, a. *tĕ-trăv'ă-lĕnt* [Gr. *tetra*, four; L. *valens* or *valen'tem*, prevailing—from *valērĕ*, to prevail]: in *chem.*, applied to elements which combine with four atoms of hydrogen, e.g., carbon.

TETTER, n. *tĕt'tĕr* [Icel. *titra;* Bav. *tattern;* Ger. *zittern*, to tremble: Ger. *zittermal*, a tetter]: in *med.*, a cutaneous disease accompanied with redness and itching (see PSORIASIS: HERPES): V. to affect with disease called tetter. TET'TERING, imp. TET'TERED, pp. *-tĕrd*. TET'TEROUS, a. *-tĕr-ŭs*, having the character of tetter.

TETUAN, *tĕt-ô-ân':* seaport-town (and small province) of Morocco, on the n. coast of Africa: the town is about 9 m. inland, 22 m. s. of Ceuta, 40 m. s. of Gibraltar; area of prov. 914 sq. m. The town is surrounded by walls, flanked with towers, and defended by a castle. Its harbor does not admit large vessels; but a brisk trade is carried on in wool, silk, girdles, leather, cotton, etc., and it exports provisions largely to Ceuta. Oranges are grown in great abundance in the vicinity, and are exported to Spain, Gibraltar, Oran, and England. T. was taken by the Spaniards under O'Donnell (q.v.) 1860, but was evacuated next year. In a year, more than 200 vessels, of 2,000 to 3,000 tons burden, entered the port of Tetuan.—Pop. of town estimated about 20,000.

TETZEL, or TEZEL, *tĕt'sĕl* (properly *Diez* or *Diezel*), JOHN: known in connection with the controversy regarding indulgences, out of which the Reformation took its rise: between 1450 and 60—1519, Aug.; b. Leipzig. T. studied in the univ.; entered the Dominican convent of St. Paul 1489; and soon gained reputation as an effective preacher. His personal character is a subject of controversy. The questions as to the teaching of T. are more important. His ability as a preacher led to his being intrusted with the charge of preaching an indulgence, first on behalf of the Teutonic Knights; afterward 1516 on the far more momentous occasion of the famous indulgence published in favor of contributors to the fund for building the church of St. Peter's at Rome. In this work it cannot be doubted that T. went to extremes which it is impossible to justify; but the worst charges, especially that of preaching the efficacy of indulgences without repentance, and of offering anticipatory pardons for future sin, are strongly denied by Rom. Cath. writers as being contradicted by contemporary authorities and by the instructions in his official commission. Much of the obloquy which he drew upon his cause was produced by the pomp and apparent luxury in which he travelled on his mission. It was in opposition to the preaching of T. that Martin Luther published his celebrated theses 1517, Oct. 31. T. replied first by publicly burning these obnoxious propositions; but he afterward published a series of counter-theses (burned in retaliation by the students of the Univ. of Wittenberg), and 1518, May, a detailed reply to Luther's celebrated Sermon on Indulgences. On the arrival of the papal delegate Miltitz, T. addressed to him a letter in reply to the charges of his adversaries; nevertheless he was summoned before Miltitz in Leipzig in Jan. following, and received a severe rebuke for his excesses in language and improprieties in proceeding, which had brought scandal on the church. He was required to withdraw to his convent at Leipzig, where he died in the same year.—See on one side, Hechlein, *Vita Tezelii;* Hofmann, *Lebensbeschreibung Tetzel's* (1844); on the other, Gröne, *T. und Luther* (1853). See also Kayser, *Geschichtsquellen über T.* (1877).

TEUCER, *tū'sĕr:* in Hellenic legend, first king of Ilium, after whom the Trojans are called Teucri.—Another T. is named in Homer; he was son of Telamon, King of Salamis, and accompanied his step-brother Ajax to the Trojan war. Returning home after the fall of Ilium, Telamon refused to receive him because he had not avenged Ajax, and T. settled in Cyprus, and founded there a kingdom.

TEU'TOBURGER WALD (L. *Teutobergiensis Saltus*): see HERMANN.

TEUTONIC, a. *tū-tŏn'ĭk:* pert. to the *Teutons* or *Teutŏnēs* (see below): N. language of the Teutons, parent of a group of European languages. *Teutonic languages* are divided into three great divisions—1, Low German, including Mœso-Gothic, Old Saxon, English, Dutch, Frisian, Flemish; 2, Scandinavian, including Icelandic, Swedish, Danish, Norwegian, and Ferroic (spoken in the Faröe Islands); 3, High German, which includes modern German (see further, PHILOLOGY—table of languages). TEU'TONS, name by which the Germans designate themselves. TEUTON'ICISM, n. *ĭ-sizm*, a Teutonic idiom or expression; a Germanism. TEU'TONIZE, v. *-īz*, to make Teutonic or German; to make conformable to German idiom or analogies; to conform to German customs, idioms, etc.—*Teutonic* is an epithet applied to a group of nations, as well as of languages, forming an important division or stem of the Aryan (q.v.) family: see PHILOLOGY. The T. stock of nations, as they exist at the present day, is divided into two principal branches: (1) the Scandinavian, embracing Danes, Swedes, Norwegians, Icelanders; (2) the Germanic, which includes, besides the German-speaking inhabitants of Germany proper (see GERMANY) and Switzerland (q.v.), also the population of the Netherlands (the Dutch), the Flemings of Belgium, and descendants of the Anglo-Saxons in Great Britain; with their offspring in N. America, Australia, and various British colonies. It is necessary in this case, as in all similar cases, to guard against making language the sole test of race. In many parts of Germany where German now prevails, Slavic dialects were spoken till recent times, and in some places are not yet quite extinct; and, in Great Britain, it is unreasonable to suppose that the Anglo-Saxon invaders exterminated the native Celtic population, or even drove more than a tithe of them into the Highlands. The mass undoubtedly remained as serfs, learned the language and customs of their masters, and gradually amalgamated with them; so that, in blood, the English are perhaps as much Celtic as Teutonic.

Of the various tribes and nations spoken of as inhabiting n. Europe in ancient times, it is often difficult to determine which were really of Germanic race, and which Celtic or Slavic: the classic writers, having no skill in detecting the affinities of language, had only confused notions of ethnology. Of undoubted German nations which took part in the destruction of the Roman empire, the most prominent were the Goths (q.v.), Lombards (q.v.), Vandals (q.v.), and Franks (q.v.). The term Teutonic is derived from

Teutones, name of a nation or tribe mentioned first by Pytheas, who wrote about B.C. 320, as then inhabiting a part of the Cimbric Chersonesus, or Jutland. For the next 200 years there is no mention of the Teutons. B.C. 113 they reappear in history as ravaging Gaul, and, in conjunction with the Cimbri and Ambrones, threatening the very existence of the Roman republic. The Cimbri having gone into Spain, the Teutones and Ambrones were at length defeated by C. Marius (q.v.) in a great battle at Aquæ Sextiæ, or Aix, in Gaul, B.C. 102, in which 100,000 to 200,000 of the invading army were slain, and many thousands made prisoners. A similar victory was gained by Marius in the following year over the Cimbri in the plains of Lombardy. It is disputed among ethnologists and historians whether the Cimbri so defeated were of Celtic or of Germanic race; and doubts have been thrown even on the claim of the Teutons to be considered Germans, though the best German scholars deem the claim established. Be that as it may, Roman writers after Cæsar and Tacitus, began to use the adjective Teutonicus as equivalent to Germanicus; and this practice was adopted in the middle ages by Germans writing in Latin. The native term was *theodisk*, from Goth. *thiud,* people; and from this word, and not from Teutonic, the modern *Deutsch* is derived. See GERMANY.

TEUTON'IC KNIGHTS: one of the famous military-religious orders to which the Crusades gave rise. The sufferings of the Christian soldiers at the siege of Acre excited the sympathy of certain merchants of Bremen and Lübeck, who rendered such important services, by erection of hospitals and otherwise, that Duke Frederick of Swabia, with the sanction of Pope Clement III. and Emperor Henry VI., enrolled them in an order of knighthood, as the T. K. of St. Mary of Jerusalem. Only Germans of noble birth were admissible to the order, the founders having probably been ennobled before being enrolled. At first all members were laymen, but priests were soon admitted as chaplains; and there was added, about 1221, a class of half-brothers similar to the serving-brothers of the Templars and Hospitallers. The habit of the order was a white mantle with a black cross; and the knights took vows of poverty and chastity, which in later times were not strictly interpreted. Their first seat was Acre. On the overthrow of the kingdom of Jerusalem, the grand master removed to Venice, and thence 1309 to Marienburg, on the banks of the Vistula. In 1237 this order became united with the Brethren of the Sword in Livonia. In the 13th c. the Teutonic Knights were, with the sanction of the pope, engaged in a bloody war to enforce Christianity on the heathen nations inhabiting the s. shores of the Baltic, which resulted in the acquisition by the order of Prussia, Livonia, Courland, and adjoining territories. Warriors from all parts of Europe in that and the following century joined their standard, including Henry IV. of England, accompanied by 300 attendant knights and men-at-arms. The conquests of the order raised it to the rank of a sovereign power, with territory extending from the Oder to the Baltic, and comprising a population of between two and three millions, the grand master having his seat at Marienburg in Prussia. The decline of the order began in the 15th c., and its fall was due partly to internal dissensions, partly to attacks by neighboring states. Sigismund of Poland wrested W. Prussia from the knights; and Albert of Brandenburg, who was chosen grand master in hopes of his aiding the order against Poland, ended an unsuccessful war with Sigismund by an arrangement according to which the territories of the order in E. Prussia were formed into a duchy, to be held by Albert and his successors. Mergentheim in Swabia then became the seat of the grand master, who was recognized as a spiritual prince of the empire. At the peace of Presburg 1805, the emperor of Austria obtained the rights and revenues of the grand master; but 1809 the order was abolished by Napoleon, its lands passing to the sovereigns in whose dominions they lay. The Teutonic order, however, still preserves a titular existence in Austria.

TEW, v. *tū* [AS. *tawian;* Dut. *touwen,* to taw or dress leather (see TAW)]: to prepare by working; beat or dress, as leather or hemp; in *OE.*, to pull about. TEW'ING, imp TEWED, pp. *tūd.* TEW'TAW, v. *-taw,* to beat so as to soften as skins or flax.

TEWEL, n. *tū'ĕl* [OF. *tuiel;* F. *tuyau*, a tube: L *tub' ŭlus*, a small pipe or tube—from *tubus*, a tube]. a pipe or funnel for smoke; the iron pipe of a forge which receives the nozzle of the bellows.

TEWFIK, *tū'fik*, I., Khedive of Egypt: 1852, Nov. 19—1892, Jan. 7 (reigned 1879–1892); son of Khedive Ismail. On the forced abdication of his father 1879, he succeeded to the viceroyalty of Egypt by a decree of the sultan of Turkey, based on the imperial firman of 1866 which changed the law of succession, except for which his uncle Halim would have succeeded. At the time of his father's abdication he was pres. of the council. The principal event of his reign was the insurrection raised by Arabi Pasha 1882. He was favorable to British policy and influence, was married to one wife, was beloved by his people, and was a model Egyptian ruler. He was succeeded by his eldest son, ABBAS PASHA, b. 1874.

TEWKESBURY, *tūks'bĕr-ĭ:* ancient municipal borough of Gloucestershire, England; in the vale of Evesham, on the Avon, near its confluence with the Severn; 10 m. n.e of Gloucester, 126 m. n.w. of London. The elaborate and magnificent parish church, an ancient edifice in Norman, is the most noteworthy architectural feature. Hosiery, shoes, nails, leather, and malt are manufactured; and T. is the centre of extensive carrying-trade on the Avon and Severn.—T., a very ancient town, appears to be of Saxon origin. Within half a mile of it was fought 1471, May 14, the famous battle of T., in which the Yorkists under Edward IV. and Richard III. inflicted signal defeat on the Lancastrians. Pop. (1881) 5,100; (1900) 3,683.

TEXARKANA, *tĕks-âr-kăn'a:* twin city, on the boundary between Tex. and Ark.; on the Texas and Pacific and the St. Louis Arkansas and Texas railroads, and at terminus of the St. Louis Iron Mountain and Southern, the Texarkana and Fort Smith, and the Texarkana and Shreveport railroads. The Ark. part of the city is the cap. of Miller co., and has machine, boiler, and car works, cotton compress, cotton-seed-oil mill, ice factories, and 1 daily and 2 weekly newspapers. The Tex. part is the cap. of Bowie co., is a large cotton-shipping point, and has important lumbering and manufacturing interests, and 1 daily and 1 weekly newspapers. Each part of T. has separate town and co. organizations.—Pop. (1880) part in Ark 1,390, Tex. 1,833=3,223; (1890) part in Ark. 3,528; (1900) part in Ark. 4,914, part in Tex. 5,256=10,170.

TEXAS, *tĕk'as:* state; one of the United States of America; 15th in order of admission into the Union; ranking (1900) 1st in area, 3d in railroad mileage and in live-stock on ranges and 6th in population; popularly known as the 'Lone Star State.'

Location and Area.—T. is in lat. 25° 51′—36° 30″ n., long. 93° 27′—106° 43′ w.; bounded n. by Indian Terr.; e. by Ark. and La., s. by the Gulf of Mexico and the Mexican republic, w. by Mexico and N. Mex.; extreme length s.e. to n.w. 825 m.; extreme breadth 740 m.; water surface 2,510 sq. m., land surface 250,004 sq. m.; gross area 252,514 sq. m. (161,608,960 acres); gulf coast line 400 m.; cap. Austin. It is 6 times larger than N. Y.; 7 times as large as O.; 100,000 sq. m. larger than all the Middle and New Eng. states including Del. and Md., and has 62,000 sq. m. more than Germany.

Topography.—T. is locally divided into central, n., s., e., and w. T. East T. is marked by a long range of hills running irregularly n.e. to s.w.; also by a heavy forest growth, principally of pine, oak, and hickory. The gulf region is bordered by an almost continuous chain of islands and by peninsulas having the same trend as the islands, the gulf border of the chain forming a regular line s.w. from the mouth of the Sabine river to near Corpus Christi, and thence with a course s. and slightly s.e. to Mexico. E. of the timber region and n. of the gulf coast is a vast open plain, with gently rolling prairies and gradual elevations, covered with luxuriant growth of native grasses, and extending to the Red river on the n. and to the mountain ranges on the w. and n.w. In this region the water-courses are generally bordered by hackberry, ash, elm, cottonwood, pecan, walnut, and various oaks. W. and n.w. of this region are the principal hills and mountain ranges of the state. In the extreme n.w., bordering Kan. and N. Mex., is an elevated table-land, formerly known as the *Llano Estacado* (Staked Plains—q.v.), and now as the 'Panhandle of Texas,' which is one of the best agricultural and stock-raising districts in the country. On a line n. of Austin and San Antonio, and running s.w., is a low range of hills that mark a change in the topography of the region. W. of this the surface is more broken, and the elevations are more abrupt. The valleys are broad, and the lands very fertile. T. claims a greater variety and richness of soil than any other state in the Union. Black waxy, black sandy, black pebbly, hog-wallow, gray sandy, red sandy, sandy loam, and alluvial soils are found in the state, and the majority of them in greater or less quantities in each division. The Brazos river bottoms are regarded as the most valuable in the state, for fertility and comparative immunity from overflows. The lower Brazos is in the heart of the sugar-growing belt.—The principal rivers are the Brazos, which drains about 35,000 sq. m., and is about 900 m. long; the Red, which drains about 29,000 sq. m.; the

Colorado, which drains 25,000 sq. m., and is more than 900 m. long; the Trinity, drainage 17,000 sq. m., length 550 m.; the Sabine, drainage 17,000 sq. m., navigable about 300 m.; the Nueces, drainage with tributaries 16,000 sq. m.; the Rio Grande, navigable 450 m. from the Gulf, drainage on the T. side about 18,000 sq. m.; the Pecos, drainage 6,000 sq. m.; and the Guadaloupe and Neches rivers. All the principal rivers flow s.e. and empty into the Gulf of Mexico, except the Red river, which flows e. to the Mississippi. The largest lake is Sabine, 18 m. long and 9 wide, and the chief bays are Galveston, Metagorda, San Antonio, Aransas, Corpus Christi, and Copano.

Climate.—The prevailing wind throughout the state is the s. wind from the Gulf, with an occasional 'norther' in Nov.—Feb., when a wet 'norther' usually lasts 24 hours, and a dry one 48. The dry ones are highly appreciated, as they drive away all miasmatic poison. N. of the parallel of 29° 40′ the mean annual temperature decreases from 68° to 55°, the latter in the Pan-Handle region; s. of that parallel it increases from 68° to 75°, the latter at Brownsville. The rainfall varies from 12–16 in. in the Pan-Handle to 20 in. along the Pecos river, 37 in. at San Antonio, and 54·47 at Galveston.

Geology.—The alluvial, tertiary, cretaceous, and carboniferous are the principal formations in the state; and there are many economic properties, some of which are already advantageously developed. The coal measures comprise two basins of bituminous and one of lignite. The first bituminous field extends from the Red river to Burnet co. on the s., with its w. boundary in Kimble, Menard, and other cos. lying n. This basin has 9 seams of coal, covers parts of 25 cos., contains 12,000 sq. m. of the coal formation, and, it is believed, will yield 2,000,000—3,000,000 tons per sq. m. The second basin is the Nueces, along the Rio Grande from Eagle Pass to Laredo, and contains both bituminous and lignite. A third unexamined basin is in Presidio co., between the Capote Mountains and the Rio Grande. The lignite belt extends over 52 cos., or across the state from the n.w. border to Webb co., and is 3–15 ft. thick. The lignite basin contains limonite and clay iron ores, of great richness, and many of them are practically free from phosphorus. The whole ore-bearing area of e. Tex. is estimated at 1,000 sq. m. In the Llano-Mason region there are magnetites and hematites, with some hydrated ores, and on the Rio Grande in the Trans-Pecos region are other deposits of good ore. Petroleum wells have been developed in Nacogdoches and Anderson cos., and there are surface indications of oil in Brown and surrounding cos. T. has three distinct copper districts: the n., comprising the Permian of Hardeman, Knox, and other cos. found in separate masses; the central or Llano district, showing gray and peacock copper, with gold or silver, or both, found in veins; and the Trans-Pecos region, from which large shipments of rich

ore are being made, particularly from the Diablo Mountains. Lead is found in Llano and Burnet cos. (galena), and in the Trans-Pecos region, carrying silver. Gypsum beds extend over a large part of the Abilene country, and as far n. as the Canadian river, but were not being worked 1901. The lignite basin contains large deposits of potters' clay, fire clays, and kaolin. Potteries, and fire-brick and tile works are in operation in several cos., and the kaolin of Edwards and Robertson cos. is highly esteemed. An excellent quality of Portland cement is manufactured from the chalk of the cretaceous area and the clays adjacent to them. East T. contains greensand marl mixed with lime, and glass sand abounds in many cos. The state is rich also in building-stones, having sandstones in various colors, limestones, granite, and white and variegated marbles. Manganese is found in Llano and Mason cos.; salt in wells, lakes, and rocks, in many places; natural gas exists in Burton and Sabine, and in McCulloch, Palo Pinto, Bexar, and other cos.; and gold and silver have been extracted from ores in central and west T., and in Llano, Presidio, and El Paso cos.—The state survey shows 35,537,967 acres of timber land in the state. Two irregular belts entering the state along the Red river in the n., and running s. across the prairie region are known as the 'cross timbers'; a belt extending from the Red river to the Brazos, about 135 m., with average width 10–15 m., is known as the 'lower cross timbers'; and another belt, leaving the Red river further n. than the 'lower cross,' dividing at Montague co., and with branches extending to the Brazos and into Erath co., is known as the 'upper cross timbers.' The principal woods are post and black-jack oaks, ash, hackberry, pecan, cottonwood, hickory, sweet and black gum, elm, long and short leaf pine, mesquite, and stunted cedar.

Zoology.—The w. and n.w. parts of the state abound in buffaloes, antelopes, wild Mexican horses, wolves, black bears, pumas, wild cats, lynx, deer, foxes, raccoons, opossums, peccaries, hares, and squirrels; game birds include wild turkey, wild duck, pheasant, brant, teal, quail, and snipe; the principal birds of prey are vultures, hawks, kites, heron, kingfishers, and flamingoes; black bass is the chief fresh-water fish, and a variety of salt-water fishes are found along the gulf coast and bays; and there are many kinds of snakes and insects.

Agriculture.—The following comparison of the United State census reports of 1890 and 1900 show a marked development of the agricultural industry:

Farms.	1890.	1900.
Number of farms	228,126	352,190
Acreage of farms	51,406,937	125,807,015
Value of farms	$399,971,289	$962,476,273

The subjoined table gives details of the principal products in 1902 as compared with 1880;

Crop.	1880.		1894-5.		
	Acreage.	Yield.	Acreage.	Yield.	Value.
Corn.....	2,468,587	29,065,172 bu	*4,087,332	107,905,565bu	$33,450,725
Wheat...	373,570	2,567,737 "	*365,200	2,081,640 "	1,373,882
Oats.....	238,019	4,893,359 "	*703,825	14,569,178 "	3,787,986
Rye.....	3,326	25,399 "	*4,387	24,129 "	18,097
Potatoes.	.....	1,688,911 "	*14,338	1,276,082 "	995,344
Hay.....,	58,033	48,430 t.	*457,214	676,677 t.	4,351,033
Barley...	5,527	72,786 bu	†4.873	78,779 bu	38,012
Rice.....	335	62,152 lb.	†6,733	103,794 "	99.302
Peas.....	.....	.....	†66,407	385,140 "	399,746
Beans....	.....	.....	†2,475	28,780 "	40,944
Millet....	.....	.....	†57,997	89,195 t.	632,675
Cotton...	2,178,435	805,284 ba	†4,988,266	2,592,855 ba	60,862,948
Sugar....	10,224	*a*	†17,739	98,614 bbl.	1,153,987
Sorghum.	.....	*b*	†127,110	*d*	1,934,539
Garden ..	.....	.....	†35,966	.....	2,194,887
Orchard..	.....	*c*	†56,536	.....	967,182
Wool ..	.....	6,928,019 lb	.....	†11,557,258 lb	810,566

* 1895; † 1894; *a*, 4,951 hhd. sugar, 810,605 gals. molasses; *b*, 432,059 gals. molasses; *c*, value $876,844; *d*, 38,425 bbl syrup, 306,792 tons forage.

The number of animals reported on the farms and ranches 1880 and 1903 was as follows:

Animals.	Number, 1880.	Number, 1903.	Value, 1903.
Horses.....	805,606	1,291,458	$38,901,203
Mules.....	132,447	407,161	20,861,205
Milch cows.....	606,176	813,852	18,116,346
Oxen and other cattle.....	3,178,429	8,007,910	109,698,754
Sheep.....	2,411,633	1,736,603	3,541,803
Swine.....	1,950,371	2,312,315	10,174,186
Total	9,384,662	14,569,299	$201,293,497

Mineral Productions.—The following were among the mineral productions of the calendar year 1894: Silver, principally in the vicinity of Shafter, Presidio co., coining value, $395,073; coal, 420,848 short tons, spot value $976,458; petroleum, all in Bexar co., and an excellent lubricant, 60 bbls.; asphaltum, all from the lithocarbon properties in Uvalde co., 3,000 short tons, value $45,000. In 1901 the silver product was 472,400 oz., commercial value $284,040; quicksilver 2,932 flasks; coal 1,107,953 short tons, val. $1,907,204; crude petroleum 4,393,658 barrels, value $1,247,357; stone, chiefly limestone and granite, valued at $237,835; val. clay products, brick and tile chiefly, $1,723,375; pottery products $90,486; portland cement $215,327; salt (1899) 312,436 barrels, val. $204,330. Petroleum production was greatly stimulated by the discoveries in 1901 at Beaumont. At the close of that year there were 619 companies in T., with total cap. of $283,509,500. Oil has been found in some 16 counties. There are 15 wells that produce natural gas.

Manufactures.—The following table gives a comparison of the manufacturing industries in 1890 and 1900, and details of principal ones, arranged in the order of value of

output, in 1900, according to the revised census returns. In 1880 the capital employed was $9,245,561; 1890 $46,-815,181; in 1900, $90,433,882.

Principal industries.	Estab.	Hands employed.	Wages paid.	Cost of materials.	Value of products.
			$	$	$
All industr's 1900.	12,289	48,153	20,552,355	62,702,169	119,414,982
" " 1890.	5,268	39,475	18,586,338	36,152,308	79,333,551
Increase.	7,021	8,678	1,966,017	28,549,861	40,081,431
Flour and grist mill products..	1,618	1,154	544,722	18,491,948	21,798,929
Lumber and timber products	1,732	11,192	3,424,510	10,008,275	18,127,784
Iron and steel...	16	1,979	539,304	3,404,154	5,080,624
Foundry and machine shops products.....	97	3,282	1,185,211	2,199,081	4,479,489
Cotton seed oil and cake.....	17	751	204,219	2,277,855	2,980,041
Leather tanned, curried, etc....	44	803	239,870	2,184,311	2,802,117
Lumber, planing mill products..	88	1,170	452,079	1,330,800	2,323,247
Printing and publishing	284	1,788	820,165	881,859	3,454,053
Cotton goods....	17	2,108	422,935	1,143,234	1,994,935
Slaughtering and meat packing (wholesale)....	8	156	60,945	1,453,128	1,671,218
Clothing, factory products	22	1,513	323,949	960,641	1,631,075
Tobacco, chewing, smoking..	35	615	152,043	516,369	1,541,475
Tinsmithing, coppersmelting and sheet-iron working..	124	418	180,779	330,519	744,171
Woolen goods...	51	1,632	294,116	874,359	1,517,194
Patent Medicines and compounds	29	399	137,691	525,193	1,504,282

In the fiscal year ending 1894, June 30, the collections of internal revenue on taxable manufactures were: Distilled spirits, $119,301.47; tobacco, $26,824.35; fermented liquors, $217,477.88; oleomargarine, $11,316; and penalties, $1,915.-81—total, $376,814.68. The same sources yielded $392,129.-07 in the year ending 1895, June 30. In the last period the two collection districts had 127 cigar factories, which used 203,484 lbs. of tobacco, and had an output of 9,335,819 cigars and 153,360 cigarettes, and 28 other tobacco factories, which used 30,104 lbs. of materials, and had an output of 416 lbs of plug and 25,518 lbs. of smoking tobacco. In the fiscal year ending 1902, June 30, receipts from taxes on distilled spirits were $98,467; tobacco $55,934; fermented liquors $754,370; oleomargarine $24,368; special taxes $96,896; penalties $2,401.

In 1895 there were 10 cotton mills reported, all of recent origin, of which 5 had combined capital of $1,385,000; 6 had 78,500 spindles; and 7 had 2,051 looms. The largest mill was at Galveston, which had 30,000 spindles and 800 looms. Mills at Denison and Dallas had 25,000 spindles and 750 looms and 10,000 spindles and 260 looms respectively. Sherman had a seamless bag mill, with 80 looms.

Commerce.—The following tables show the movement of merchandise and of gold and silver coin and bullion in the fiscal year ending June 30:

MERCHANDISE.

Ports.	Imports.		Exports.	
	1895.	1896.	1895.	1896.
Brazos de Santiago.....	$148,395	$163,730	$255,302	$380,325
Corpus Christi.....	653,594	905,067	3,399,630	4,181,645
Galveston.....	369,575	602,770	41,886,651	36,397,091
Paso del Norte.....	746,861	1,330,996	2,799,351	3,835,545
Saluria.....	607,303	690,909	1,682,312	1,644,446
Total.....	$2,525,728	$3,693,172	$50,023,246	$46,439,052

COIN AND BULLION.

Brazos de Santiago.....	$56,998	$67,129	$43,200	.....
Corpus Christi.....	851,509	1,173,053	15,083	$13,370
Paso del Norte.....	4,481,564	7,261,538	217,600	16,227
Saluria.....	440,704	593,412	240,802	158,723
Total.....	$5,830,775	$9,095,132	$516,685	$188,320
Grand Total	8,356,503	12,788,604	50,539,931	46,627,372

Transportation.—The railroad development of the state has been as follows: (1854) 32 m.; (1860) 307; (1870) 711; (1875) 1,572; (1880) 3,244; (1886) 6,918·79; (1888) 8,210·57; (1890) 8,754·31; (1895) 9,290·70. The operating corporations reported: Capital stock, $138,673,202; funded debt, $196,-490,846; total investment, $346,705,876; cost of roads and equipments, $327,348,557; passenger earnings, $3,814,795; freight earnings, $12,985,969; gross earnings, $17,903,735; net earnings, $8,170,209; and interest paid on bonds, $6,513,-684. The state railroad commission reported that 41 cos. had an aggregate of 4,669·50 m., 125 others had an average of 36 m. each, and 81 had none; and Gov. Culberson estimated the true valuation of all railroad property in the state at $375,000,000, and the taxable valuation at $75,000,000. It was declared that all the new construction 1891–95 was in cos. already fully provided with railroad facilities. In 1902, Nov., the total mileage was 10,681; val. rolling stock $10,386,232.

Finances.—Under an act of the legislature of 1893, before any municipality or co. can issue any bond it must receive from the atty.-gen. a certificate that the proposed bond is a legal obligation, and must register the bond with the state comptroller, and on the issue of the bond under these requirements its validity is beyond question excepting on the grounds of fraud or forgery. In 1895 the state had a total bonded debt of $3,992,030, of which state educational and charitable institutions held $3,241,540, and the public $750,-490. The total bonded debt 1902, Sept. 1, was $3,989,400, of which $3,301,600 was held in State funds, including $2,213,500 in school funds. In 1902 the valuations were: Real estate, $729,950,627; personal prop., $287,621,105; total $1,017,571,732; and the tax rate $3.46 per $1,000.

Banking.—Official reports for 1895, Oct. 31, showed

there were 214 national banks in operation and 48 in process of liquidation. The active banks had a combined capital of $22,523,090; U. S. bonds on deposit $5,415,500; circulation, issued $16,395,330, redeemed $11,295,301, outstanding $5,100,029; loans and discounts $45,205,987; deposits $32,979,037; reserve required, $4,946,856; reserve held $9,035,447; and ratio of reserve 27·40 per cent. The exchanges at the U. S. clearing-houses at Dallas, Fort Worth, Galveston, Houston, and Waco in the year ending 1895, Sep. 30, aggregated $443,618,354, an increase of $71,570,488 over the preceding year. There were 8 state banks (June 29) with combined capital $885,150; deposits $1,034,021; and 25 private banks with cap. $3,090,434. In 1902 there were 318 nat. banks in operation (cap. $23,128,250), 255 private banks (cap. $8,211,068), and 6 loan and trust companies.

Religion.—According to the revised census report issued 1895, T. had (1890) 8,766 religious organizations, 5,638 church edifices (and 2,816 halls used for religious purposes), 677,151 communicants, and church property valued at $8,682,337. The following table gives in detail the denominational statistics, omitting halls in column of 'edifices':

Denominations.	Organizations.	Edifices.	Members.	Value of church property.
Adventists	24	2	773	$2,800
Reg. Bapt. S	2,318	1,081	129,734	1,384,035
Reg Bapt. col'd	1,464	1,258	111,138	664,286
Freewill Bapt	8	6	261	3,300
Primitive Bapt	257	173	7,032	66,325
Other Bapt	14	3	358	1,150
Brethren, Plymouth	5	.....	111	.....
Rom. Cath	263	189	99,691	1,018,800
Christadelphian	3	.....	100	.....
Christian	6	.....	118	.....
Christ. Scientist	5	.....	112	.....
Christian Union	6	.....	190	.....
Ch. of New Jerusalem	1	1	40	4,000
Congregational	15	12	846	55,300
Disciples of Christ	536	267	41,859	467,900
Dunkards	6	1	95	300
Evang. Assoc	8	7	296	22,950
Friends	1	.....	120	.....
Germ. Evang. Prot	2	2	1,050	10,500
Germ. Evang. Synod	19	14	1,804	36,300
Jewish	11	8	1,994	182,000
Latter-day Saints	12	6	437	1,900
Luthern, Gen. Coun	42	39	7,140	128,740
Luthern, Syn. Con	28	21	3,498	30,675
Luthern Ind. Syn	18	20	3,918	51,500
Meth. Episc	407	346	27,453	592,835
Meth. Episc., S	1,701	1,076	139,347	1,647,866
Meth. Prot	158	31	5,526	16,700
African Meth	409	462	45,318	406,865
Other Meth	41	25	1,236	13,125
Presb. N	61	44	2,812	164,850
Presb. S	242	171	10,774	672,806
Cumberland Presb	506	227	24,037	445,329
Assoc. Presb	7	4	188	3,500
Prot. Episc	139	110	7,097	624,900
Salvation Army	4	.....	35	.....
Spiritualist	1	.....	29	.....
Universrlists	18	2	514	5,800

The Rom. Cath. Church has the dioceses of Dallas, Galveston, Laredo, and San Antonio; the Prot. Episc. Church those of Texas, N. Texas, and W. Texas; and the Meth. Episc. Church, South, has a bishop resident at Sherman.

At the tenth international Sunday-school convention, held in Denver, Col., 1902, June 26-30, there were reported in T. 5,591 evangelical Sunday schools, 42,923 officers and teachers, and 343,024 scholars—total members 386,943.

Education.—T. has the most richly endowed state system of public education in the United States. At the time of the admission of the Texas republic into the American Union, the Texans were permitted to retain control of all the public lands in their territory; and a large part of these was set apart for benefit of the public schools, the state univ., and the various state charitable institutions. The endowment of the public schools 1894–5 comprised about $7,484,598 in interest-bearing bonds, more than $14,000,000 in interest bearing land notes, and about 23,000,000 acres of unsold lands. Of the unsold lands, 20,000,000 acres were leased at 4 cts. per acre, and the funds thus derived added to the annual available school-fund. Beside this endowment, each co. has been given by the state 4 leagues of land for a co. public-school endowment. In addition to the interest on bonds and land notes and rentals from leases, the state levies an annual school-tax of 2 mills, and gives ¼ of the occupation taxes, and an annual poll tax of $1 to the available school-fund. The entire amount of available apportioned public-school fund for 1894–5 was $2,836,363; the total receipts by local treasurers, including balances from the previous year were $3,962,637; and the disbursements for the year were $3,675,501.

The public school system is organized on the community, district, and city or independent district plans. In 1894–5 there were 35 community counties, 191 district counties, and 200 city and independent districts. The general school age was 8–16 years; in some localities under special laws 6–21; children under and over the general age were permitted to attend school on paying tuition. Of the state bonded debt 1895 ($3,992,030), the permanent school fund held $2,162,600, state univ. fund $567,540, agricultural and mechanical college $209,000, and the deaf and dumb asylum $61,000. The scholastic census of 1895 showed the following: White, males 280,842, females 267,062, total 547,904; colored, males 85,539, females 85,362, total 170,901; grand total, 718,-805; increase over the previous year 25,153. There were 12,462 public-school teachers, to whom $2,892,296 was paid in salaries.

The Sam Houston State Normal School, at Huntsville, was established 1879; is strictly professional, with the aim of qualifying students in the best possible manner for teachers; admits no students under 17 years of age; and requires all graduates to teach for a stipulated time in the public schools. During 1879–90 the school had 2,306 students and 1,128 graduates. In 1889 the school had more than 300 students, and had so outgrown its accommodations that the legislature voted $40,000 to erect an additional

building. In its 16th year (1894–5) the school had an enrolement of 549 students. The school has grounds and buildings valued at $151,781, and library and apparatus $18,000; and received from appropriations for its maintenance from its organization to 1894–5, $317,000. The Prairie View State Normal School, 6 m. e. of Hempsted, Waller co., is a branch of the State Agricultural and Mechanical College, and is used exclusively for training colored teachers. All the teachers are colored; both sexes are admitted; more than 2,300 teachers have received professional training in it; one state student from each senatorial district and 15 from the state at large are admitted for free tuition; legislative provision has been made for thorough industrial training also; and the school has grounds and buildings valued at $125,000, and library and apparatus $13,000.—The State Agricultural and Mechanical College, at College Station, Brazos co., 95 m. n.w. of Houston, was established by act of legislature 1871, on a national land-grant endowment of 180,000 acres of public land, which were sold for $174,000, and the money invested in 7 per cent. state bonds. The co. of Brazos gave the college 2,416 acres of land on each side of the Houston and Texas Central railroad; the legislature made the institution a branch of the State Univ.; and it was formally opened 1876, Oct. 4. In 1894–5 it had grounds, buildings, equipments, and stock valued at $392,-502. An agricultural experiment station has been established on the college grounds, under the act of congress appropriating $15,000 annually to the states toward the support of such institutions.

The State Asylum for the Blind is a school rather than a permanent home for blind persons, and was established 1856, Sep. 2. The instruction is in the ordinary English courses, with industrial training to enable graduates to become self-supporting. The asylum—largest of its kind in the south—is at Austin, and had (1895) 15 officers and teachers, 14 employés, 171 pupils, $135,000 in grounds and buildings, $1,250 in scientific apparatus, and $6,500 in school and musical apparatus. The State Deaf and Dumb Asylum, also in Austin, had, in addition to the courses usual to such schools, a printing office, bindery, shoe factory, carpentry and joinery shop, and art department. In 1893 there were 9 male, 6 female, 3 articulation, and 6 industrial instructors, and 224 pupils, of whom 72 were in the industrial classes and 40 in the articulation. The Deaf and Dumb and Blind Asylum for Colored Youth, 2¼ m. n.w. of Austin, was opened 1887, Oct. 1, and 1893 had 41 deaf and dumb pupils and 55 blind, and industrial departments for each.

In 1895 there were 13 universities and colleges of liberal arts, with 196 professors and instructors; 3,839 students (males 2,524, females 1,315); 36,145 vols. in the libraries; scientific apparatus and libraries valued at $97,-350; grounds and buildings valued at $1,356,500; productive funds $736,821; and total income (1893–4) $277,985, with $24,100 in gifts. These institutions were: T. Univ., Austin, opened 1883; Howard Payne College, Brownwood,

1890 (Bapt.); Fort Worth Univ., Fort Worth, 1881 (Meth. Episc.); St. Mary's Univ., Galveston, 1854 (Rom. Cath.); Southwestern Univ., Georgetown, 1873 (Meth. Episc., S.); Wiley Univ., Marshall, 1873 (Meth. Episc.); Mansfield College, Mansfield, 1869 (non-sect.); Austin College, Sherman, 1851 (Presb. S.); Salado College, Salado, 1860 (non-sect.); Trinity College, Tehuacana, 1869 (Cumber. Presb.); Add-Ran Christian Univ., Thorp Spring, 1873 (Disciples); Baylor Univ., Waco, 1846 (Bapt.); and Marvin College, Waxahachie, 1872 (non-sect.). Belton, Bonham, Chapel Hill, and Waco had colleges for women exclusively. There were 42 endowed and denominational secondary schools, with 180 instructors, 3,574 students, and grounds, buildings, and apparatus valued at over $700,000. Six colleges had normal departments. Instruction in theology was provided by Trinity College at Tehuacana, in law by the Law School of the State Univ. at Austin, and in medicine by the Department of Medicine of the State Univ. at Galveston. Besides the state institutions of a combined educational and charitable character already mentioned, there was a State House of Correction and Reformatory at Gatesville.

Libraries.—According to the govt. report on public libraries in the United States of 1,000 vols. and upward each 1891, T. had 27 libraries, containing 86,603 bound vols., and 8,401 pamphlets. The libraries comprised 5 general, 5 school, 12 college, 1 college soc., 1 law. and 3 garrison.

Illiteracy.—In 1880 there were 1,064,196 persons 10 years old and upward enumerated, of whom 256,223 were unable to read, and 316,432 unable to write. The percentage of total illiterates was 29·7; of native white illeterates 13·9; and of foreign white illiterates 24 7. In 1890 the number 10 years old and upward enumerated was 1,564,755, of whom 308,873 were classified as illiterates, or 19·7 per cent. Of 1,228,601 whites 132,389, or 10·8 per cent., were illiterates; of native whites, 89,829, or 8·3 per cent.; and of foreign whites, 45,560, or 29.6 per cent. In 1900 the number of males of voting age was 737,768: of this number 30,017 native whites were illiterate, and 61,468 native negroes.

Periodicals.—In 1896 there were reported 698 newspapers and periodicals, of which 64 were daily, 1 tri-weekly, 12 semi-weekly, 575 weekly, 1 bi-weekly, 3 semi-monthly, 1 quarterly, and 41 monthly publications.

Post-offices.—the post-offices 1896 numbered 2,736, of which 7 were first-class, 16 second-class, 113 third-class (total presidential 136), and 2,600 fourth-class. There were 680 full and 68 limited money-order offices.

History.—The earliest records relating to T. show a struggle between the French and Spaniards for possession of the region. In 1687 Sieur de la Salle made a landing in Metagorda Bay, believing it to be the mouth of the Mississippi river, built a fort on Levaca Bay or river, naming it Fort St. Louis, and established a small colony. Two or three years afterward Capt. Alonzo de

Leon, Spanish officer, established the mission of San Francisco at the same place, and a mission and trading post at Nacogdoches, despite the protest of Capt. de St. Denis, the French commander at Natchitoches, who by reason of La Salle's prior occupation, claimed the region for the king of France. From various causes both of these settlements were short-lived, though the Spaniards were maintaining strong colonies a considerable distance up the Rio Grande river. In 1714 the French made a second attempt to plant a colony, and Capt. de St. Denis, the younger, was sent by Gov. Crozat, of the province of La., to establish a settlement on the Rio Grande. The officer reached the river, was taken prisoner by the authorities of Coahuila, subsequently married a daughter of the Spanish commander at the mission of San Juan, and aided in establishing three Spanish missions within the present limits of T. Under the name of 'the new Philippines,' the region remained in the peaceful possession of the Spaniards till 1735, when a French colony on Red river was removed to T. The Spaniards protested, but failed to drive the French away, and at length acknowledged their right to the site of their settlement. Both parties had trouble with the Indians. From 1758, when the Indians massacred all the people at the mission of San Saba, all the missions and settlements declined in population and influence. In 1763 the rivalry between the French and the Spaniards was ended by the cession of the La. territory by France to Spain. In 1803 Spain receded the region to France, by whom it was sold to the United States the same year (see LOUISIANA, *History*). Then a controversy arose between Spain and the United States over the boundaries of the territory, which remained unsettled till 1819, when Spain ceded Fla. to the United States, and the latter guaranteed to Spain the territory that she claimed w. of the Sabine river. In the meantime the region comprising the present state of T. was the scene of much trouble from revolutionary parties and filibusters, and many lives were lost. Lafitte, the pirate, occupied Galveston Island, and established the town of Campeachy. By 1821, when Mexico became independent of Spain, T. had become nearly depopulated. In 1822 Stephen F. Austin (q.v.) planted a colony on land in T., selected from the grant previously made by the Spanish authorities to his father, and in 1823 the grant was confirmed. The colony grew rapidly, and no trouble occurred till the province of Coahuila was united to T. by the constitution of the Mexican republic 1824. The attempt to govern the united provinces, one wholly Mexican, the other almost wholly American, by Mexican laws and Mexican officers, placed the American colonists under great hardship, and was the beginning of the opposition that led to the independence of T., its admission into the American Union, and the war between Mexico and the United States. In 1830 Bustamente, who had made himself dictator of Mexico, forbade peo-

ple from the United States to enter T. as colonists; the colonists there attempted to separate from Coahuila, but failed through the actions of Santa Anna; a revolution broke out; and the govt. of Coahuila and T. was overthrown. A battle was fought at Gonzales 1835, Oct. 2; the Texans captured Goliad Oct. 9; another battle occurred at Concepcion, near San Antonio, Oct. 28; an independent provisional govt. was organized by the Texans Nov. 12; and by the capture of San Antonio de Bexar, Dec. 10, the Texans drove the last body of armed Mexicans from their territory. Soon afterward Santa Anna organized an army of 7,500 men, well supported with artillery and provisions, and marched toward San Antonio. Near it was the Alamo, a strong fort, garrisoned by 172 Texans, commanded by William B. Travis. Santa Anna began investing the place 1836, Feb. 3, and after bombarding it for 11 days, carried it by storm Mar. 6, and butchered the whole garrison, after losing 1,600 men of his own army. On the 27th following Santa Anna accepted the surrender of the Texan force at Goliad, under command of Col. James W. Fannin, and immediately murdered every one. While these events were in progress a declaration of independence was made 1836, Mar. 2, a provisional govt. was elected 16th, and a constitution adopted and signed 17th. Gen. Houston, commander-in-chief of the Texan army, retreated to the San Jacinto river, where, on Apr. 21, with 800 men, he fought the decisive battle of the war, defeating Santa Anna, who had twice the number of troops, killing 630, wounding 208, taking 730 prisoners, and capturing Santa Anna himself (on the following day). The independence of the Texan republic was recognized by the United States 1837, Mar., by France 1839, and by England, Holland, and Belgium 1840. The Texans maintained their republic till 1846, Feb. 19, when their govt. accepted the proposition for annexation to the United States and admission into the Union as a state, contained in an act of the U. S. congress 1845, Dec. 27.

In 1850, in consideration of $10,000,000 in bonds, the state ceded to the federal govt. its claim to all territory beyond its present limits. Immediately prior to the opening of the civil war, Gov. Houston was urged by the secessionists to call a special meeting of the legislature. He refused. An irregular convention was held, which was sanctioned by the legislature assembled under the governor's call 1861, Jan. 21. The convention reassembled Jan. 28, adopted an ordinance of secession Feb. 1, which the people ratified Feb. 23, and on Mar. 6 the office of gov. was declared vacant because Gov. Houston had refused to take the oath of allegiance to the Confederacy. On Feb. 18, Gen. David E. Twiggs, U.S.A., commanding the department of T., surrendered all the troops, forts, guns, ammunition, and stores to the Confederate authorities. Galveston was occupied by the federal troops 1862, Oct. 8, but was retaken by

the Confederates 1863, Jan. 1; and later in the year Brownsville and several other places in w. T. were occupied by a Union army. The last battle of the war occurred in w. T. 1865, May 13, and the last Confederate army, under Gen. Kirby Smith, surrendered in T. on the 26th. In 1869 a new constitution was adopted and ratified; and 1870 the 14th and 15th amendments to the federal constitution were ratified, the state was readmitted to the Union Mar. 30, and its govt. was turned over to the civil authorities Apr. 16.

Government.—The executive authority is vested by the constitution (1876) in a gov., elected for 2 years, salary $4,000 per annum; a lieut.gov., elected at the same time and for the same period, salary $5 per day during the session of the legislature; state treas., elected for 2 years, salary $2,500; comptroller of public accounts, elected for 2 years, salary $2,500; atty.gen., elected for 2 years, salary $4,000; commissioner of general land office, elected for 2 years, salary $2,500; supt. of public instruction, elected for 2 years, salary $2,500; sec. of state, appointed for 2 years, salary $2,000; commissioner of agriculture, insurance, statistics, and history, appointed for two years, salary $2,000; adjt.gen., appointed for 2 years, salary $2,000; and supts. of the various state institutions, all appointed for 2 years, average salary $2,000 per annum. The gov. must be at least 30 years old, a citizen of the United States, or of T. at the time of the adoption of its constitution, and have resided in the same for 5 years next preceding the election. He has both general and special veto powers, for he can disapprove parts or items in a bill without affecting the remainder, and can veto every bill passed by the legislature within the last 10 days of the session, by filing his objections with the sec. of state within 20 days after adjournment, and giving public notice thereof by proclamation. In all criminal cases, except treason and impeachment, he has power to grant reprieves, commutations, and pardons, and with the advice and consent of the senate has the pardoning power in cases of treason. The lieut.gov. must have the same qualifications as the gov., is pres. of the senate, and has, when it is in committee of the whole, a right to debate and vote on all questions, and when the senate is equally divided, to give the casting vote.—The legislative authority is vested in a general assembly, comprising (1903) a senate of 31 members, a house of representatives of 128 members, senators elected for 4 years, representatives for 2 years, salary of each limited to $5 per day for the first 60 days of a session and $2 per day thence to end of session, with $5 mileage for every 25 m., sessions biennial. Senators must be 26 years old, and residents of the state 5 years and of the district one year next preceding the election; and representatives must be 21 years old, and residents of the state 2 years and of the co., city, or town one year next preceding the election.

Extra sessions of the legislature may be called by the gov. at any time.—The judicial authority is vested in a supreme court of a chief justice and two associate justices, elected for 6 years, salary of chief justice $4,000, of associates each $3,550 per annum, a criminal court of appeals, 5 civil courts of appeals, one for each district into which state is divided, who are appointed and receive same salary as other judges; district courts (47) of one judge each, elected for 4 years; co. courts of one judge each, elected for 2 years; and justices of the peace, etc. The procedure in actions at law is in many respects peculiar to the state on account of being a survival of early Spanish methods. Beside the courts mentioned, each co. is divided into 4 commissioners' precincts, for the purpose of representation in the commissioners' court, which has general charge of co. affairs; each precinct has one commissioner, elected for two years, and (1890) there were 768 commissioners in all. Each co. is further divided into not less than 4 nor more than 8 justices' precincts, each of which has a justice of the peace or magistrate, elected for 2 years; total justices' precincts (1890) 1,536. The supreme court has appellate jurisdiction only, coextensive with the limits of the state. It also has power to ascertain such matters of fact as may be necessary to the exercise of its authority. The court of appeals has appellate jurisdiction coextensive with the limits of the state in all criminal cases, and in all civil cases in which the co. courts have original or appellate jurisdiction. The state is divided into 3 districts for holding U. S. district courts; the court in the e. district is held at Sherman, in the w. district at Austin, in the n. district at Dallas; salary of U. S. district court judges $5,000 per annum. T. is a part of the 5th U. S. judicial circuit.

The state has records of the chief executives of T., as colony, province, republic, and state, covering the period from 1691 to 1897. Under Spain 1691–1822, there were 22 administrations; under Mexico 1822–35, there were 7. Since the separation from Mexico, the successive executives, have been as follows:

Provisional Governor.

Henry Smith ..... 1835, Nov. 12—1836, Mar. 18

Presidents.

David G. Burnet.....1836, Mar. 18—Oct. 22
Samuel Houston.....1836, Oct. 22—1838 Dec.
Mirabeau B. Lamar.....1838—1840, Dec.
David G. Burnet (act'g.) .....1840, Dec.—1841, Dec.
Samuel Houston.....1841, Dec.—1844, Dec.
Anson Jones.....1844, Dec.—1846, Feb. 19

State Governors.

J. P. Henderson..... 1846–47
George T. Wood.....1847–49
P. H. Bell 1849–53
Edward M. Pease 1853–57
H. G. Runnels.....1857–59
Samuel Houston.....1859–61
Edward Clark (act'g.)..... .1861
Francis R. Lubbock.....1861–63
Pendleton Murray.....1863–65
A. J. Hamilton (provis.)....1865–66
J. W. Throckmorton.....1866–67
Edward M. Pease.....1867–70
Edmund J. Davis 1870–74
Richard Coke.....1874–77
Richard B. Hubbard.....1877–79
Oran M. Roberts.....1879–83
John Ireland.....1883–87
Lawrence S. Ross.....1887–91
James S. Hogg.....1891–95
Charles A. Culberson.....1895–99
Joseph D. Sayers.....1899–1903
S. W. T. Lanahan.....1903–

Counties, Cities, and Towns.—T. was divided (1896, Dec). into 226 organized and 21 unorganized counties, and in addition to the unorganized counties there was a vast excess of territory over the constitutional limits (new cos. 900 sq. m., cos. created from old ones not less than 700 sq. m.) in the older cos. Counties are created by the legislature, and unorganized or disorganized ones may organize at any time. Greer co. (1890 pop. 5,338) is claimed by T. and by the United States as a part of Oklahoma Terr. Divisions of land in T. are made according to Spanish land measurement, by varas, labors, and leagues, viz.: 1 vara = 33⅓ in.; 1 acre = 5,646 sq. varas, or 4,840 sq. yards; 1 labor=1,000,000 sq. varas, or 177 acres; 1 league=25,000,000 sq. varas, or 4,428 acres; and 1 league and labor=26,000,000 sq. varas, or 4,605 acres. In 1890 and 1900 the most populous counties and cities were:

Counties.	1890.	1900.	Counties.	1890.	1900.
Dallas	67,042	82,726	Hunt	31,885	47,295
Grayson	53,211	63,661	Ellis	31,774	50,059
Berar	49,266	69,422	Fayette	31,481	36,542
Tarrant	41,142	52,376	Galveston	31,476	44,116
McLennan	39,204	59,772	Washiugton	29,161	32,931
Fannin	38,709	38,709	Smith	28,324	37,370
Laviar	37,302	48,627	Hill	27,583	41,355
Harris	37,249	63,786	Harrison	26,721	31,878
Travis	37,019	47,386	Robertson	26,506	31,480
Collin	36,736	50,087	Navarro	26,373	43,374
Bell	33,297	45,535	Williamson	25,878	38,072

Cities and Towns.	1890.	1900.	Cities and Towns.	1890.	1900.
Dallas	38,007	42,638	Austin	14,476	22,258
Sau Antonio	37,673	53,321	Waco	14,445	20,686
Galveston	29,084	37,789	Laredo	11,319	13,429
Houston	27,557	44,633	Denison	10,958	11,807
Fort Worth	23,076	26,688	El Paso	10,338	15,906

Politics.—State, congressional, and presidential elections are held on Tuesday after the first Monday in Nov. All persons under 21 years of age, idiots and lunatics, paupers supported by any co., persons convicted of any felony, and soldiers, marines, and seamen in the service of the United States are excluded from voting. All other male citizens who have resided in the state one year next preceding the election and the last 6 months within the district or co. where they offer to vote, are qualified electors. For presidential vote see PRESIDENT AND VICE PRESIDENT, ELECTIONS OF.

Population.—(1850) white 154,034, free colored 397, slaves 58,161, total 212,592; (1860) white 420,891, free colored 355, slaves 182,566, total 604,215; (1870) white 564,700, colored 253,475, total 818,579; (1880) white 1,197,237, colored 395,640, total 1,591,749; (1890) 2,235,523; (1900) 3,048,710.

TEXAS, UNIVERSITY OF: co-educational institution, organized 1883, with academic and law departments at Austin, medical and pharmaceutical at Galveston, and agricultural and mechanical at College Station. In 1895 it had 46 pro-

fessors and instructors, 700 students in all departments, 13,000 vols. in the libraries, $580,000 in productive funds, and $70,000 income from all sources. The academic department, literature, science, and the arts, had 15 separate schools, 24 professors and instructors, and 323 students (206 males and 117 females). The main univ. occupied as a campus the 40 acres originally set aside by the republic of T. for a university, on which were three buildings, a chemical laboratory, a dormitory and restaurant, and an unfinished central building, used for lecture rooms, libraries, and laboratories. The agricultural and mechanical college had (1901) an experiment staff, faculty 26, students 382, area under cultivation 150, value of farm and grounds $48,320, and special buildings and equipments valued at $481,139. Chairman of faculty, Wm. L. Prather, LL.D.; pres. of agricultural coll., D. F. Houston, A.M.

TEXAS CATTLE-PLAGUE, or TEXAS FEVER, or SPANISH FEVER, or SPLENIC FEVER, etc.: see CATTLE-PLAGUE—Texas Fever.

TEXEL, *těks'ĕl*, THE: island in the province of N. Holland, separated from the Helder by a narrow strait, called the Marsdiep; containing about 35,000 acres of arable and pasture lands. Many sheep are kept, producing fine wool. Fishing, ship-building, grinding corn, etc., are sources of prosperity. There is much wealth in the island. The n. part is called Eijerland, or the egg-country, immense flocks of birds coming thither from Scandinavia to deposit their eggs.—Pop. of T. about 6,400.

TEXT, n. *tĕkst* [F. *texte*, a text—from L. *textum*, that which is woven, a web—from *texo*, I weave]: that on which a commentary is written; the subject of a sermon or discourse, as a selected verse or passage of Scripture; a written composition or book, as distinguished from notes or comments; large round hand-writing used in the body or text of a manuscript, or of the kind first set to pupils learning to write; a particular type of letter, as German text. TEXTUAL, a. *těks'tū-ăl*, of the text; contained in the text; serving as a text. TEX'TUALLY, ad. *-li*. TEX'TUALIST, n. *-ĭst*, one who adheres to the text; one ready in citing texts. TEX'TUARY, n, *-ĕr-ĭ*, one of a sect of Jews who rigidly adhere to the text of the Heb. Scriptures. TEXT-BOOK, book used by students as a standard or basis for a particular branch of study; selection of passages of Scripture arranged for reference.

TEXTILE, a. *těks'tĭl* [L. *tex'tĭlis*, woven, wrought—from *texo*, I weave]: woven; capable of being woven. TEXTORIAL, a. *těks-tō'rĭ-ăl*, belonging to weaving. TEXTILE FABRICS: see WEAVING.

TEXTURE, n. *těks'tūr* [F. *texture*—from L. *textūra*, a web, a construction—from *texo*, I weave]: the art of weaving; that which is woven; a web; disposition of the threads of a woven material; hence surface quality or structure in general. TEX'TURAL, a. *tūr-ăl*, of or pert. to a texture, or characteristic of it.

TEZCUCO, *tĕs-kō′kō* ('place of detention'): ancient and decayed city of Mexico, on the e. shore of the lake of T. in the state of Mexico, 16 m. e.n.e. of the city of Mexico. In former times, it was cap. of a great state, and was the second city in Mexico. In the early part of the 15th c., T. rose to its greatest splendor; it then contained ranges of stately mansions, in which the nobles resided, and a magnificent and vast pile of buildings, which served as the royal residence and as public offices. T. is now a poor place, filled with heaps of rubbish and ruins. Pop. 5,000.

THACHER, *thăch′ĕr*, JAMES: 1754, Feb. 14—1844, May 24; b. Barnstable, Mass.: physician. He studied medicine; was appointed surgeon's mate to Dr. John Warren at Cambridge 1775; served as surgeon in the army till the close of the revolution; and after the war settled at Plymouth. He was a member of the National Acad. of Arts and Sciences, and published *Military Journal of the Revolution* (1824); *Modern Practice of Physic* (1817); *American Medical Biography* (1828); *Essay on Demonology* (1831); and *History of the Town of Plymouth* (1832).

THACH′ER, PETER, D.D.: Congregational minister: 1752, Mar. 21—1802, Dec. 16; born Milton, Mass. He graduated at Harvard 1769, was ordained at Malden 1770, had part in the constitutional convention 1780, was prominent in local learned societies and philanthropy; also as chaplain of the legislature 15 years, and as pastor of the Brattle St. Church in Boston 1785 till his death. He published a narrative of the battle of Bunker Hill, strictures on the power of churches in dismissing pastors (1783), memoirs of Dr. Boylston (1789), and an oration of some note against standing armies. His reputation was that of an orator and patriot.

THACH′ER, THOMAS: 1620, May 1—1678, Oct. 15; b. Salisbury, Eng.: son of the Rev. Peter T. He removed to Boston 1635; studied theol., and was ordained pastor of the First Church (Congl.) at Weymouth 1644, Jan. 2; returned to Boston 1664; and practiced medicine till 1669, Feb. 16, when he was chosen first pastor of the Old South Church in Boston. He published *A Brief Rule to Guide the Common People of New England how to Order Themselves and Theirs in the Small Pocks or Measels* (1677); and *A Fast of God's Chusing* (1674); and prepared a *Hebrew Lexicon*, never published.

THACKERAY, *thăk'ĕr-ĭ*, WILLIAM MAKEPEACE: one of the greatest Eng. novelists and satirists: 1811, July 18—1863, Dec. 24; b. Calcutta; of a good old English family, represented about the middle of the 18th c. by Dr. Thackeray, eminent scholar, head-master of Harrow. His father and grandfather were in the civil service of the E. India Company; and from his father, who died young, T. inherited a fortune of £20,000. At the age of seven years he was sent to England, and placed in the Charter-house School, that ancient Carthusian foundation, which he loved to commemorate in his writings. He next went to Cambridge, but left the univ. without taking a degree. In 1831 he was at Weimar, and saw Goethe. His ambition was to become an artist, and he travelled over most of Europe, studying at Paris and Rome. His drawings were not without merit; they were quaint, picturesque, and truthful; yet they missed the bright touches of a master-hand. He turned to literature, beginning with rare patience and contentment at the lowest step. Under the characteristic name of Michael Angelo Titmarsh, or that of Fitz-Boodle, he became a constant contributor to *Fraser's Magazine*, and wrote for it two of the best of his minor works, *The Great Hoggarty Diamond*, and *Barry Lyndon*. The latter is the story of an Irish sharper, told with a spirit, variety of adventure, and humor worthy of Le Sage or Fielding. Under the pseudonym Titmarsh, he published also *The Paris Sketch-book* (2 vols. 1840), *The Second Funeral of Napoleon*, and *Chronicle of the Drum* (1841), and the *Irish Sketch-book* (2 vols., 1843). The greater part of T.'s fortune having been spent in foreign travel and unsuccessful speculations, he wrought steadily at literature as a profession. He was not at first widely popular, but a few good judges appreciated his keen wit, observation, and irony, and his command of a style singularly pure, clear, and unexaggerated. The establishment of *Punch* afforded a more congenial field for T., and his *Snob Papers* and *Jeames's Diary* were hailed with delight by all readers. Their author's reputation was still more advanced by his novel *Vanity Fair* (1846–48), pub. in monthly parts in the style of *Pickwick*, and illustrated by the novelist himself, 'illuminated with the author's own candles,' as he expressed it. During the progress of *Vanity Fair* appeared *Notes of a Journey from Cornhill to Grand Cairo*, an account of a journey for his health; also *Mrs. Perkins's Ball*, a short Christmas tale, and two works of similar kind, *Our Street*, and *Doctor Birch and his Young Friends*. In 1849, he began a second serial fiction, *Pendennis*, in which much of his own history and experiences are recorded. Next followed *Rebecca and Rowena* (1850), and *The Kickleburys on the Rhine* (1851). The latter work was sharply criticised by the *Times;* and T. replied in a caustic and humorous *Essay on Thunder and Small Beer*, prefixed to a 2d ed. of the satirical sketch. In 1851 the indefatigable novelist delivered a course of lectures on *English Humorists of the Eighteenth Century*—light, graceful, discriminating sketches, with passages of real power

and eloquence. 1852–55, appeared two more novels, the most richly imaginative and highly finished of his works, *Esmond*, and *The Newcomes*. These were followed by *The Virginians* (an inferior novel), by *Lectures on the Four Georges* (delivered first in America), by *Lovel the Widower*, and *Philip* (two short tales of somewhat coarse texture), and by a series of pleasant gossiping essays, *Roundabout Papers*. These originally appeared in the *Cornhill Magazine*, of which T. was for a time editor; and in the same miscellany he had begun and published part of a new novel, *Dennis Duval*, which promised to be one of the most carefully elaborated and successful of his works of fiction. He contemplated also *Memoirs of the Reign of Queen Anne*, which would have served as continuation to Macaulay's *History*. He knew that period well, from his previous studies for *Esmond*, and as a moral anatomist and master of English he stood unrivalled. But, alas! such dreams and anticipations were suddenly dispelled. To the grief of all lovers of genius and of manly and noble character, T. was cut off in the fulness of his powers in his 52d year, dying alone and unseen in his chamber before daybreak on the morning of the day before Christmas 1863. His medical attendants found that death was caused by effusion on the brain, and that his brain was one of the largest, weighing 58½ ounces.

In his delineation of the character and genius of Fielding, T. has drawn his own. He had the same hatred of all meanness, cant, and knavery, the same large sympathy, relish of life, thoughtful humor, keen insight, delicate irony, and wit. There was, however, one personal difference: Fielding was utterly careless as to censure of his works, whereas T. was tremblingly alive to criticism, and was wounded to the quick by the slightest attack. His morbidly delicate organization made him exquisitely susceptible of either pain or pleasure. He had suffered much from physical maladies and from domestic calamity; and his earlier works, especially *Vanity Fair*, were tinged with a degree of cynicism which seemed to countenance the charge of his unfriendly critics, that he delighted in representing the baser side of human nature, and was skeptical as to the existence of real virtue in the world. His strength lay in portraying character rather than inventing incidents; and in Becky Sharp, Colonel Newcome, Harry Foker, Laura Pendennis, and Paul de Florac, as in the picaroon, Barry Lyndon, he has left us a living gallery, certainly not surpassed by any modern novelist. In his later writings, the dark shades no longer preponderate: the mellowing influence of years and sickness, and calmer as well as more extensive observation of life, had sunk the merciless satirist in the genial humorist and philosophic observer. He had still ample scorn for falsehood and vice, and satire for folly and pretense; but he had also smiles and tears, and tenderness and charity, that gave moral beauty and interest to the last decade of his brilliant career as an author.—In poetry T.'s few writings have given him high rank as a ballad writer, and as a translator in verse:

notable are his *Chronicle of the Drum*, and his translations from Béranger.—In deference to his wishes, no adequate biography of T. has yet appeared. See Trollope's *Thackeray* (1879), *English Men of Letters Series*. Besides several popular and uniform editions, a splendid *edition de luxe* of his writings, 24 vols., appeared 1881.—His oldest and only surviving daughter, ANNE ISABELLA (T.) RITCHIE, wife of Richmond Ritchie, is a finished writer of fiction: she was b. in London. Her novels are chiefly studies of character, within somewhat confined limits. She has issued, among other works, *To Esther* (1869); *Old Kensington* (1873); *The Story of Elizabeth* (1876); *Miss Angel* (1875); *A Book of Sybils* (1883); *Mrs. Dymond* (1885).

THAIRMS: see THERMS.

THAIS, *thā'ĭs:* Athenian courtesan, in the latter part of B.C. 4th c.; famous for wit and beauty, who was in Asia with Alexander the Great, and according to Cleitarchus—a doubtful authority—induced the Macedonian king, when excited with wine, to set fire to the palace of the Persian kings at Persepolis. After his death, she lived with Ptolemy Lagi, by whom she became the mother of several children.

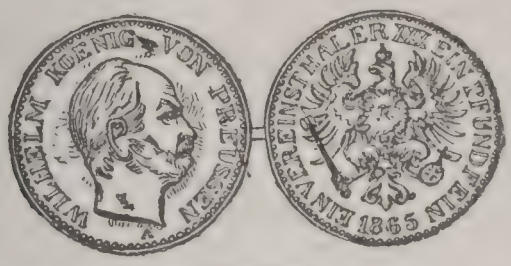
THALAMIUM, n. *thăl-ā'mĭ-ŭm* [L. *thălămus;* Gr. *thalămŏs*, an inner chamber, a sleeping-room, a bed]: in *bot.*, the layer of reproductive cells in the apothecia of lichens.

THALAMUS, n. *thăl'ă-mŭs* [L. *thălămus;* Gr. *thalămŏs*, a sleeping-room]: in *anat.*, that part of the brain from which the optic nerves are partly derived; in *bot.*, the receptacle of the flower, or the part of the peduncle into which the floral organs are inserted. THAL'AMIFLO'RAL, a. *-mĭ-flō'răl*, or THAL'AMIFLO'ROUS, a. *-flō'rŭs* [L. *flos* or *flōrem*, a flower]: in *bot.*, having the petals and stamens inserted on the receptacle or thalamus.

THALASSID'ROMA: see PETREL.

THALBERG, *tăl'bĕrĕh*, SIGISMOND: eminent pianist and composer for the pianoforte: 1812–1871, Apr. 27; b. Geneva. He received the greater part of his musical education at Vienna, where he was pupil of Hummel. He made his first public appearance 1826, and his *début* in Paris in 1837; though in 1830 he had taken rank as a pianist with no rival but Liszt. After residing for a time in the United States, he returned to Europe. In graceful and brilliant execution, delicacy of touch, and manual dexterity on the piano, he was almost unrivalled. His compositions, which are very numerous, are principally fantasias and variations.

THALER: dollar, German coin of silver, uttered first at Joachimsthal (hence *Joachimsthaler Münze*, shortened to *Thaler*): see JOACHIMSTHAL. The T. was originally coined 1518, and bore the arms of the Herren von Schlik (who coined it), and effigy of St. Joachim. The present Reichsthaler is equal to 3 marks (gold), and is worth $0.714 (gold) in the United States.



Thaler.

THALES, *thā'lēz*, OF MILETUS: early Greek philosopher, founder of the Ionic or physical school of philosophy, and chief of the Seven Wise Men (q.v.): B.C. 640–546; b. Miletus, in Asia Minor. He is recognized as the founder of Greek geometry, astronomy, and philosophy. Very little is known regarding his life. He is said to have recommended the Ionians, who were menaced by the Persians, to form a federation against their powerful enemy, and to select Teos as the capital. At a later period, we are told, he induced the Milesians to withdraw from a union with Crœsus against Cyrus. He is also said to have predicted the eclipse of the sun which happened B.C. 585, May 28, in the reign of Alyattes; and the abundant ancient testimony to this is now generally accepted so far as concerns T.'s predicting an eclipse for the year in which it occurred. His claim to the title of sage (as in the case of his compeers) was due to his practical wisdom rather than to his speculative achievements; nevertheless, T. has a name in the history of speculative philosophy. He is even regarded by some as the *first* Greek that speculated on the constitution of the universe. He seems to have sought amid the variety of things one material cause. According to him, the original principle of all things is water; from which everything proceeds, and into which it is again resolved. It appears also that in connection with this doctrine he had some idea of a soul or force in water productive of all phenomena. None of T.'s speculations were committed to writing, and it is only from the notices of later Greeks, Herodotus, Aristotle, etc., that we can gather an idea of his thinking.

THALIA, n. *thă-lī'ă* [L. *Thalīa;* Gr. *Thaleï'a*—from Gr. *thallō*, I flourish or bloom]: in *anc. myth.*, the muse who presided over pastoral and comic poetry; one of the Graces (see CORYBANT) in *astron.*, one of the asteroids. THALI'AN, a. *-lī'ăn*, pertaining to Thalia; comic.

THALLINE: see under THALLUS.

THALLIUM, n. *thăl'lĭ-ŭm* [Gr. *thallos*, the shoot of a plant, suggestive of greenness], (symb. Tl, at. wt. 204, sp. fir. 11·9): a metal whose existence was first recognized by an intense green line appearing in the spectrum of a game in which T. is volatilized. T. was discovered by Crookes 1861, in the seleniferous deposit of a lead chamber of a sulphuric acid factory in the Harz Mountains; and it was soon obtained in large quantities by Lamy. T. is slightly heavier than lead—a metal which it resembles in physical properties. It is very soft, being readily cut with a knife, or drawn into wire; and its freshly cut surface exhibits brilliant metallic lustre and grayish color, between that of silver and of lead. In contact with the air, it tarnishes more rapidly than lead, and becomes coated with a thin layer of oxide, which preserves the rest of the metal. It fuses at 290° C., and at a red heat becomes volatilized. It is crystalline in structure, crackles like tin when bent, but is highly malleable. The metal and its compounds give a bright green tint to colorless flames; the spectrum of T. is marked by a single sharply defined green line. It is used to produce a green light in firework displays, and is employed to render glass highly refractive. The metal can best be preserved free from oxidation by being covered with paraffin and kept under water. T. forms a number of compounds, including three oxides. Thallious oxide (Tl_2O) is the most important; it is easily soluble in water, producing a caustic alkaline solution. There was long a difference of opinion as to whether the salts of T. are or are not powerful irritant poisons. Lamy, by a series of experiments on animals, satisfied himself that they are, a very small quantity sufficing to destroy hens and puppies. Crookes was long inclined to an opposite opinion; but it is now agreed that the salts of T. are poisonous—see Crookes's Memoirs in *Philosophical Transactions* 1862, and in *Chemical News*, 1874; and Lamy's Memoir in *Annales de Chimie et de Physique*, 1863.

THALLOGEN, n. *thăl'lō-jĕn* [Gr. *thallos*, a young shoot; *gennăō*, I produce]: one of a large class of cellular cryptogamous plants, the lowest of the four great divisions of plants (see BOTANY), including slime-molds, diatoms, green slimes, algæ and fungi, usually consisting of thallus, and, if more differentiated, with no endogenous root and no root cap: called also THALLOPHYTE, *thăl'ō-fīt*. THALLOGENOUS, a. *thăl-ŏj'ĕn-ŭs*, pertaining to.

THALLUS, n. *thăl'lŭs*, THAL'LI, n. plu. *-lī* [L. *thallus*; Gr. *thallos*, a young shoot or branch]: in *bot.*, a solid mass of cells, without woody fibre, and consisting of one or more layers, usually in the form of a flat expansion, and having no morphological distinction of stem, leaves, and roots. T. assumes very various forms, sometimes crust-like, sometimes spread out like a leaf, simple, lobed, or branched; or, as in mushrooms, it becomes a stalk, cap, and gills. THAL'LOME, n. *-lōm*, any organ developed in the type of a thallus. THALLINE, a. *thăl'lĭn*, pertaining to the thallus; in *bot.*, of the same substance as the thallus. THALLODAL, a. *thăl'ŏ-dăl*, in same sense.

THALMUD, n. *tăl'mŭd:* see TALMUD.

THAMES, *tĕmz* [L. Tam-*es*is; the root *tam* probably meaning broad, and *es*is or *is*is being identical with *esk*, *ex*, *ouse*, etc., all from Celt. *uisg*, water]: the most important river of Great Britain, and the longest in England; flowing e.s.e. across the s. portion of the country. Its remotest springs—those of the upper waters of the Churn—rise 370 ft. above sea-level on the s.e. slope of the Cotswold Hills, 3 m. s. of Cheltenham, 7 m. w. of the Severn at Gloucester. The springs unite about a mile from their sources, and form the Churn, which flows s.e. 20 m. to Cricklade, and there receives the T., which joins it from the west after a course of 10 m. The T., or Isis (which is the name of its upper course) then flows e.n.e. about 35 m., when, curving s.e., it passes Oxford, and flows on to Reading, where, after receiving the Kennet from the w., it changes to a generally eastward course, passing Windsor, Eton, Richmond, London, Woolwich, and Gravesend; a few miles below which it expands into a wide estuary, and enters the North Sea. The tide rises to Teddington about 19 m. above London Bridge; and above that point navigation is by locks. The total length of the T. from Thames Head to London Bridge is 170 m., to Sheerness 228 m.; area of its basin 6,100 sq. m. In the greater part of its course, it forms the boundary between several of the s. counties. Its chief affluents are the Coln, Leach, Windrush, Cherwell, Thame, Colne, Lea, and Roding, on the left; and the Kennet, Loddon, Darent, Mole, and Medway, on the right. At Vauxhall Bridge, the width of the river is about 690 ft.; at London Bridge, 870 ft.; at Woolwich, 1,470 ft.; at Gravesend Pier, 2,400 ft.; 3 m. below Gravesend, 3,870 ft.; and at its mouth, between Whitstable and Foulness Point, about 8 m. below the Nore, it is 18 m. across. At the Nore Light, the commonly reputed mouth of the T., the breadth is 6 m. The river is navigable for barges to Lechlade, more than 200 m. from its mouth; and it is connected with the Thames and Severn, Oxford, Wilts and Berks, Grand Junction, and other canals, through which it has communication with the w. and s. coasts, and with all parts inland. Vessels of 800 tons can reach St. Katharine's Docks, while those of 1,400 tons can ascend to Blackwall, 6 m. below London Bridge. The part of the river immediately below London Bridge is called the *Pool;* and the part between the Bridge and Blackwall is called the *Port.* Two embankments or esplanades have been formed, one on the n. shore from Blackfriars Bridge to Westminster, and one on the s. shore from Westminster Bridge to Vauxhall. See LONDON.—In the phrase, 'To set the Thames on fire,' to cut a figure in the world; to become distinguished for ability, the word *Thames* is probably a corruption of OE. *temse*, a sieve, a bolter—the suggestion being that a very diligent and energetic workman might by his rapid work overheat the woodwork of the bolter and so set it on fire.

THAMES, Battle of the: engagement 1813, Oct. 5, between a force of Americans under Gen. William Henry Harrison and a Brit. force under Gen. Proctor, near the Moravian towns on the river Thames in Ontario, Canada. In this action the Indian chief Tecumseh (q.v.) was slain: see Harrison, William Henry.

THAMES, *tāmz*, River: in s.e. Conn., formed by the Quinebaug, Shetucket, and Yantic rivers, flowing s. 15 m. and emptying into Long Island Sound. Large steamboats ascend it as far as Norwich, at which point the Quinebaug and Yantic unite, the Shetucket emptying into the Quinebaug 3 m. above. The T. affords an excellent harbor for New London, which is situated on it, 3 m. from its mouth.

THAM'MUZ: see Tammuz.